

Circuit notes**COMPONENT VALUES**

Resistors : no suffix =ohms, k =kilohms, M =megohms.

Capacitors : no suffix =microfarads, p =picofarads, n =nanofarads.

† value selected during test, nominal value shown.

VOLTAGES

Voltage measurements were made using a 20 k Ω /V meter, and are shown adjacent to the point to which the measurement refers.

WAVEFORMS

Oscillograms were taken using a dual trace, 100 MHz bandwidth, oscilloscope, and a x10 probe. Control settings of the TF 2370 together with oscilloscope triggering information, and horizontal and vertical sensitivities at the probe tip, are shown.

SYMBOLS

Symbols are in accordance with BS 3939 with the following additions :

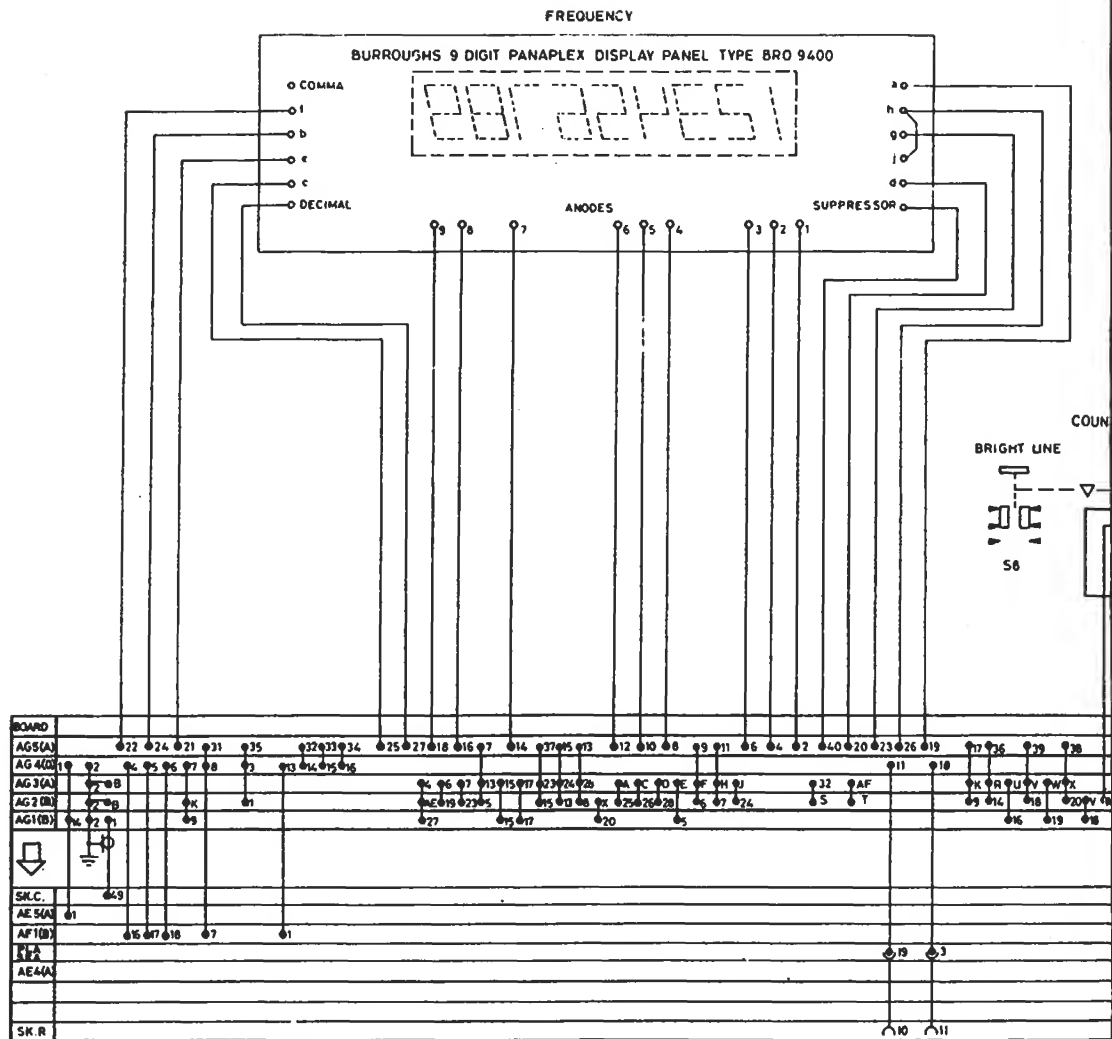
TP6
—○ test point

2 waveform reference number

AE1 sub-assembly designation



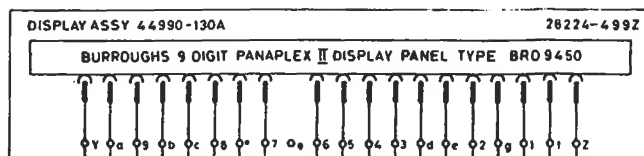
2370 (1g)



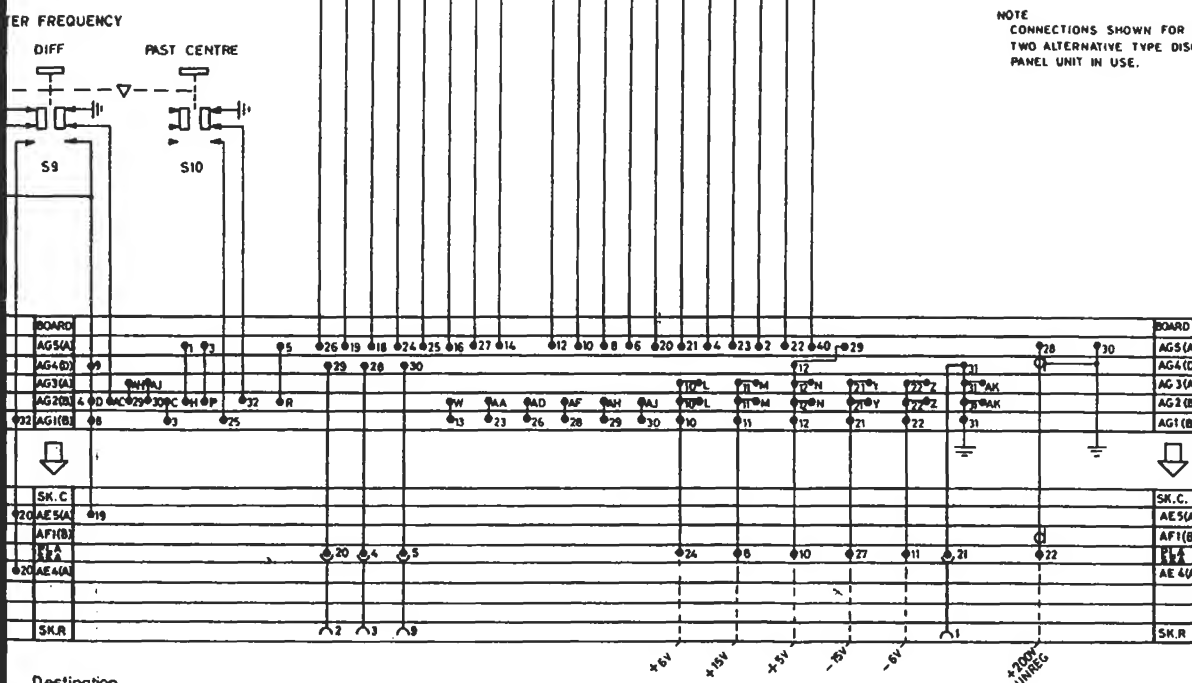
PLA WIRING CONNECTIONS

Pin no.	Destination.	Pin no.	Destination.	Pin no.
1.	— Braid of co-ax from pin 25 on AM2.	11.	— -6V (Blue/Brown) to:-	25.
2.		(a) Pin 22 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 22 & Z on AF1(B), AF2(A)	26.	
3.	— Lead to pin 18 on AG4(D)	AG2(B) & AG3(A).	27.	
4.	— Lead to pin 28 on AG4(D)	(b) Pin 16 on SK. B.		
5.	— Lead to pin 30 on AG4(D)	12.	— Earth.	
6.		13.	— Lead to c.r.t. heater.	
7.	— +80V (Red/Green) to:- Pin 8 of AM2 and pin 8 of AM3.	14.		
8.	— +15V (Red/Orange) to:-	15.	— Mains supply lead (see details on AKO)	28.
(a) Pin 11 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pins 11 & M on AF1(B), AF2(A), AG2(B) & AG3(A).	16.	— Mains supply lead (see details on AKO)	29.	
(b) Pin 6 on AM2 and pin 22 on AM3.	17.	— Inner of co-ax from pin 26 of AM2	30.	
(c) Pin 6 on SK. B.	18.		31.	
9.	— +5V (Z) (Red/Black with red sleeve) to:-	19.	— Lead to pin 11 on AG4(D)	32.
(a) Pin 12 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A).	20.	— Lead to pin 29 on AG4(D)		
(b) All upper front panel connections (see AO1 Part 1.)	21.	— Lead to pin 31 on AG4(D)		
(c) Pin 12 on SK. B.	22.	— +200V to pin 28 of AG5(A) (RED)		
10.	— +5V (I) (Red/Black with brown sleeve) to:-	23.	— +30V (Red/White) to:-	
(a) Pin 12 & N on AF1(B), AF2(A), AG2(B) & AG3(A) and Pin 12 on AG1(B) & AG4(D).	(a) Pin 20 of AM2 and pin 20 of AM3		(a) Pin 20 of AM2 and pin 20 of AM3	
(b) Pin 16 on SK. B.	(b) Pin 4 on SK. B.		(b) Pin 4 on SK. B.	
	24.	— +6V (Red/Brown) to:-		
	(a) Pin 10 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 10 & L on AF1(B), AF2(A), AG2(B) & AG3(A).			
	(b) Pin 8 on SK. B.			
	(c) R1 on AO1 (Part 1)			

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NOTE
CONNECTIONS SHOWN FOR THE
TWO ALTERNATIVE TYPE DISPLAY
PANEL UNIT IN USE.

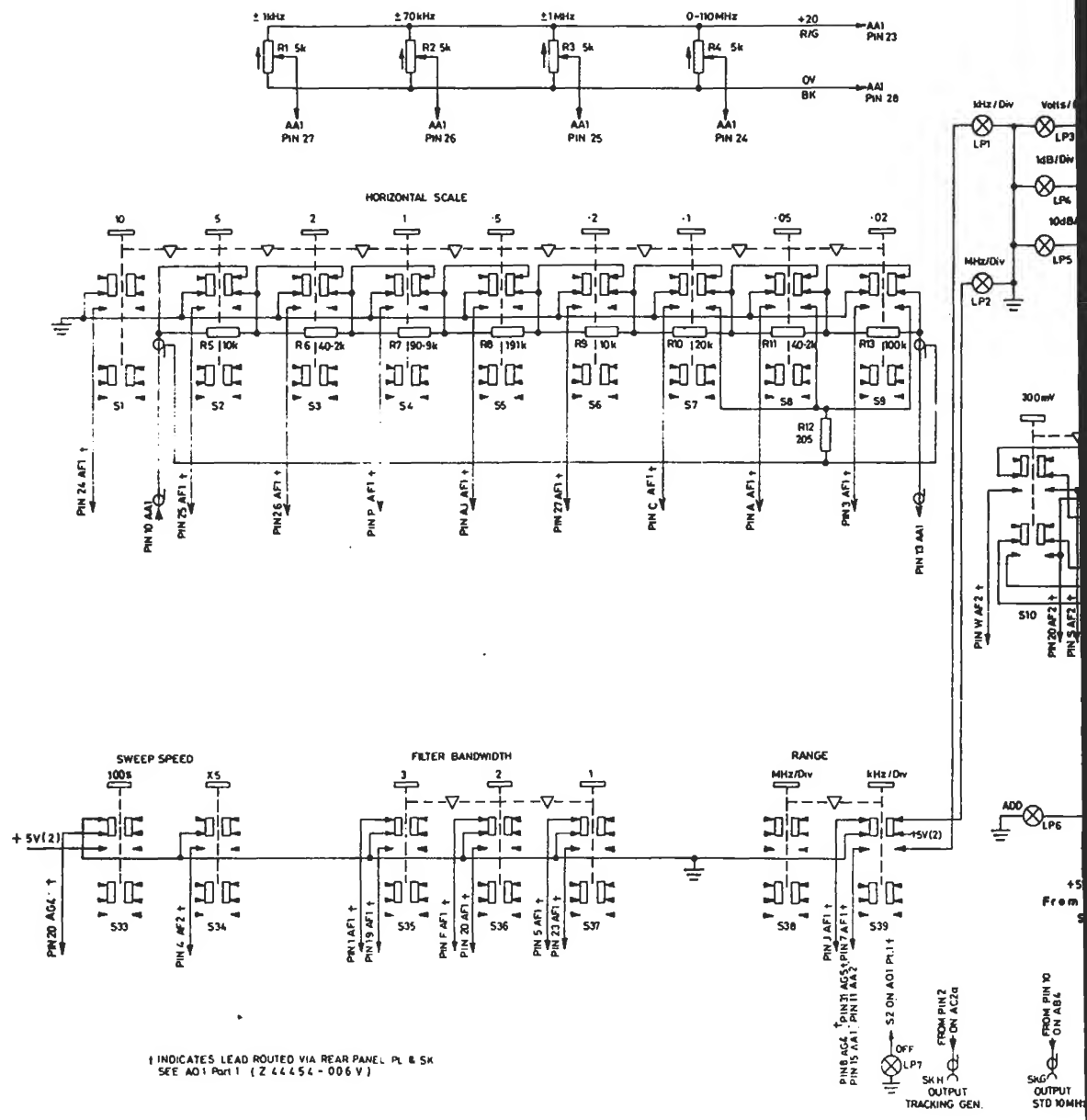


Destination.

- +5V(2) connected to pin 9.
- +5V(1) connected to pin 10.
- 15V (Blue/Orange) to:
 - (a) Pin 21 on AD1, AD2, AE1(A), AE2(A), AE3(A), AE4(A), AE5(A), AE6(A), AG1(B) & pin 21 & Y on AF1(B), AF2(A), AG2(B) & AG3(A).
 - (b) Pin 12 on AM3.
 - (c) R 4 on AD1 (Part 1).
 - (d) Pin 18 on SK B.
- Earth, connected to pin 12.
- Lead to c.r.t. heater

- Mains supply lead (see details on AK0)
- Mains supply lead (see details on AK0)

Fig. 7.2 Upper front panel wiring A01 (part 2)



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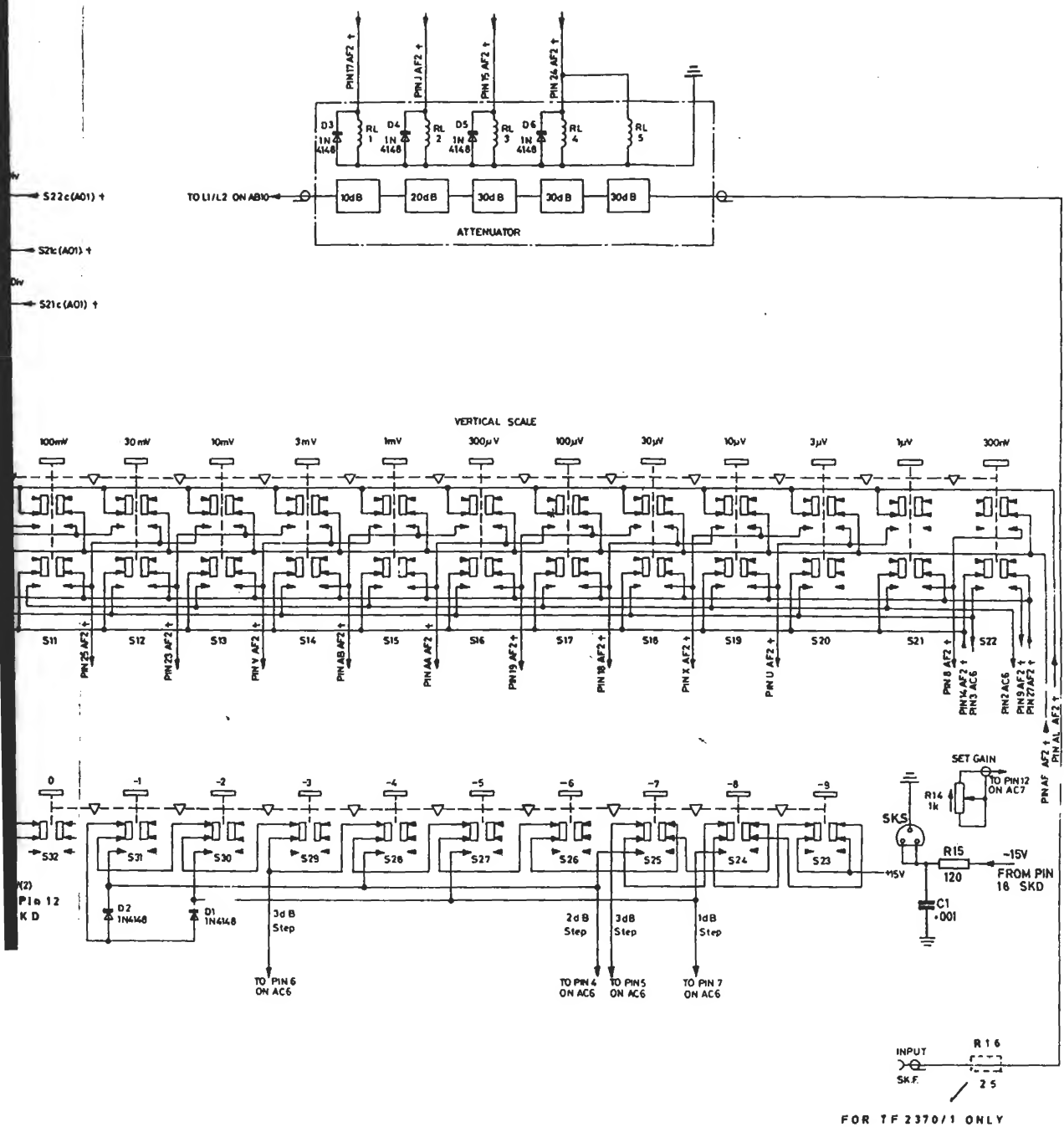
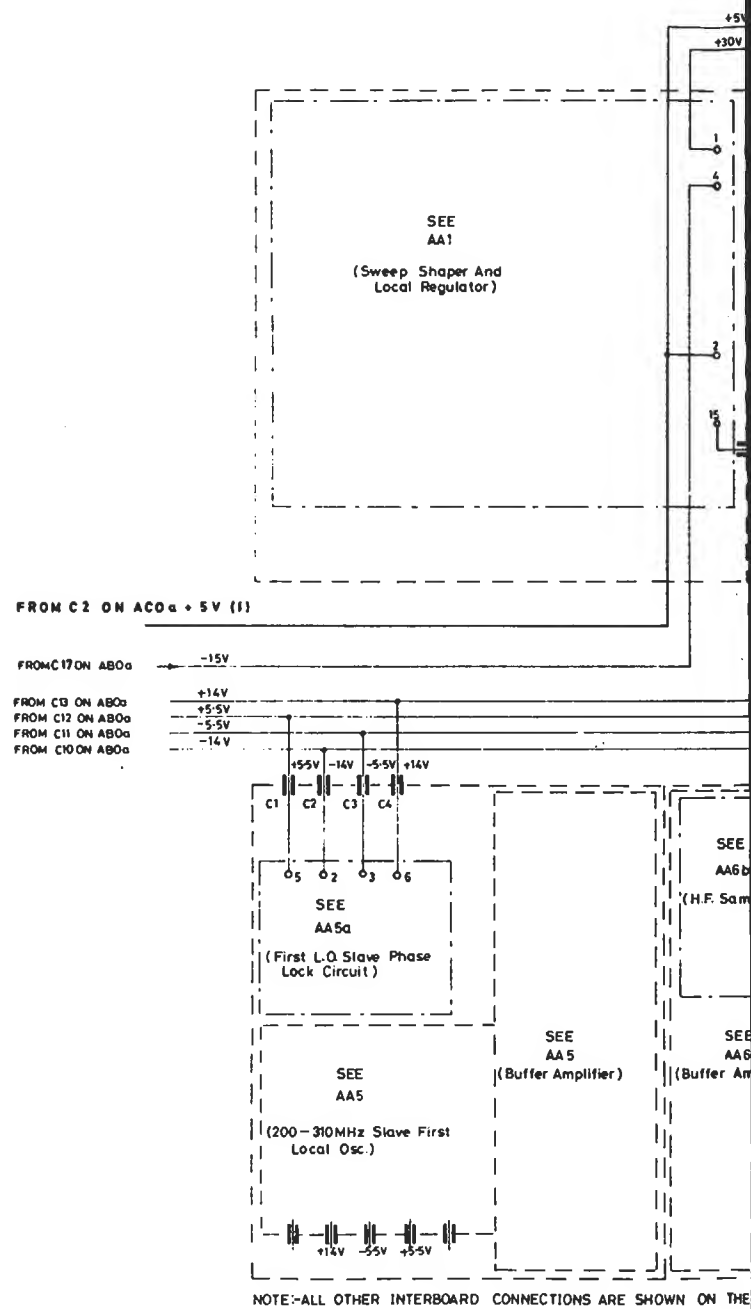


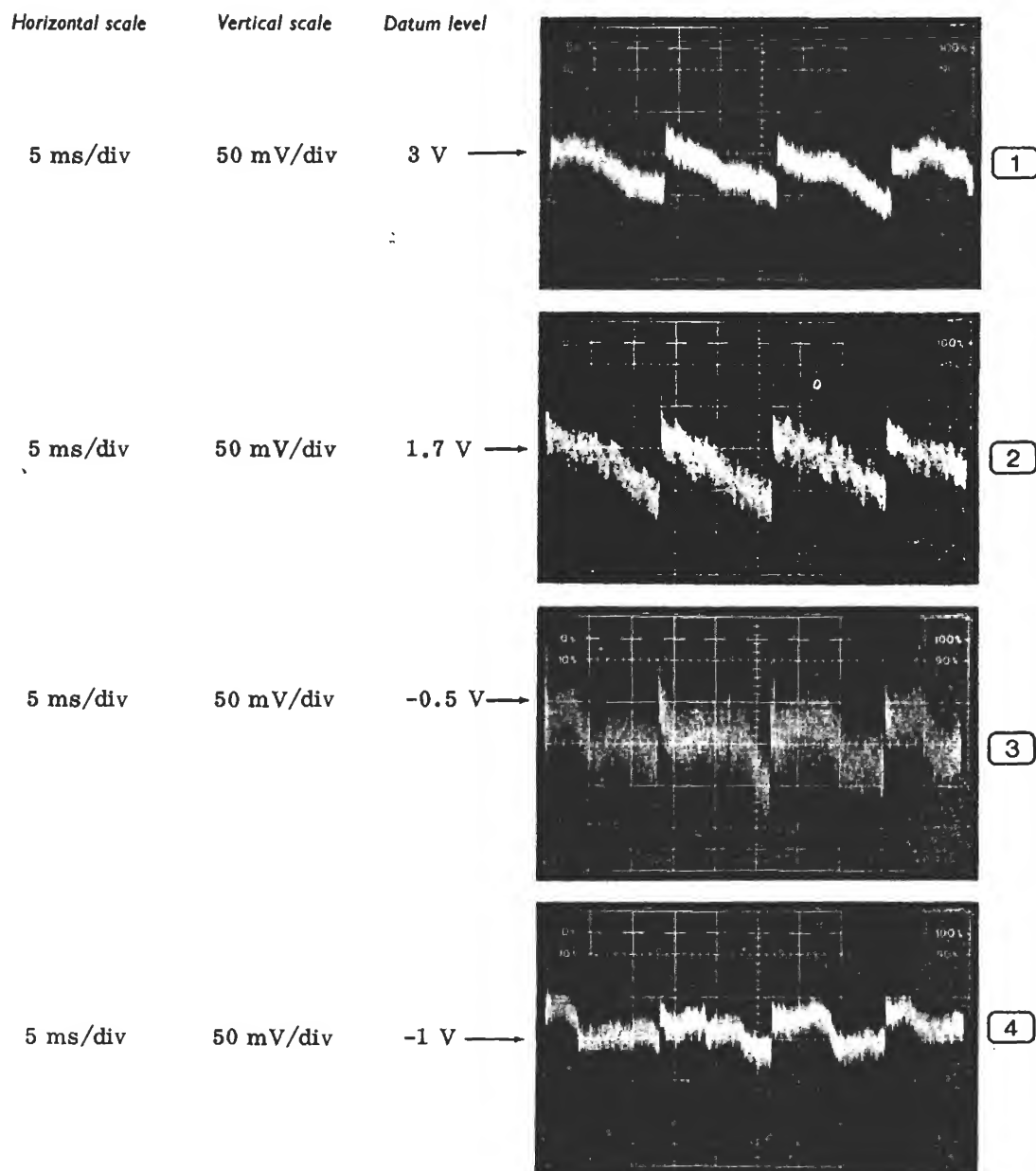
Fig. 7.3 Lower control panel A02

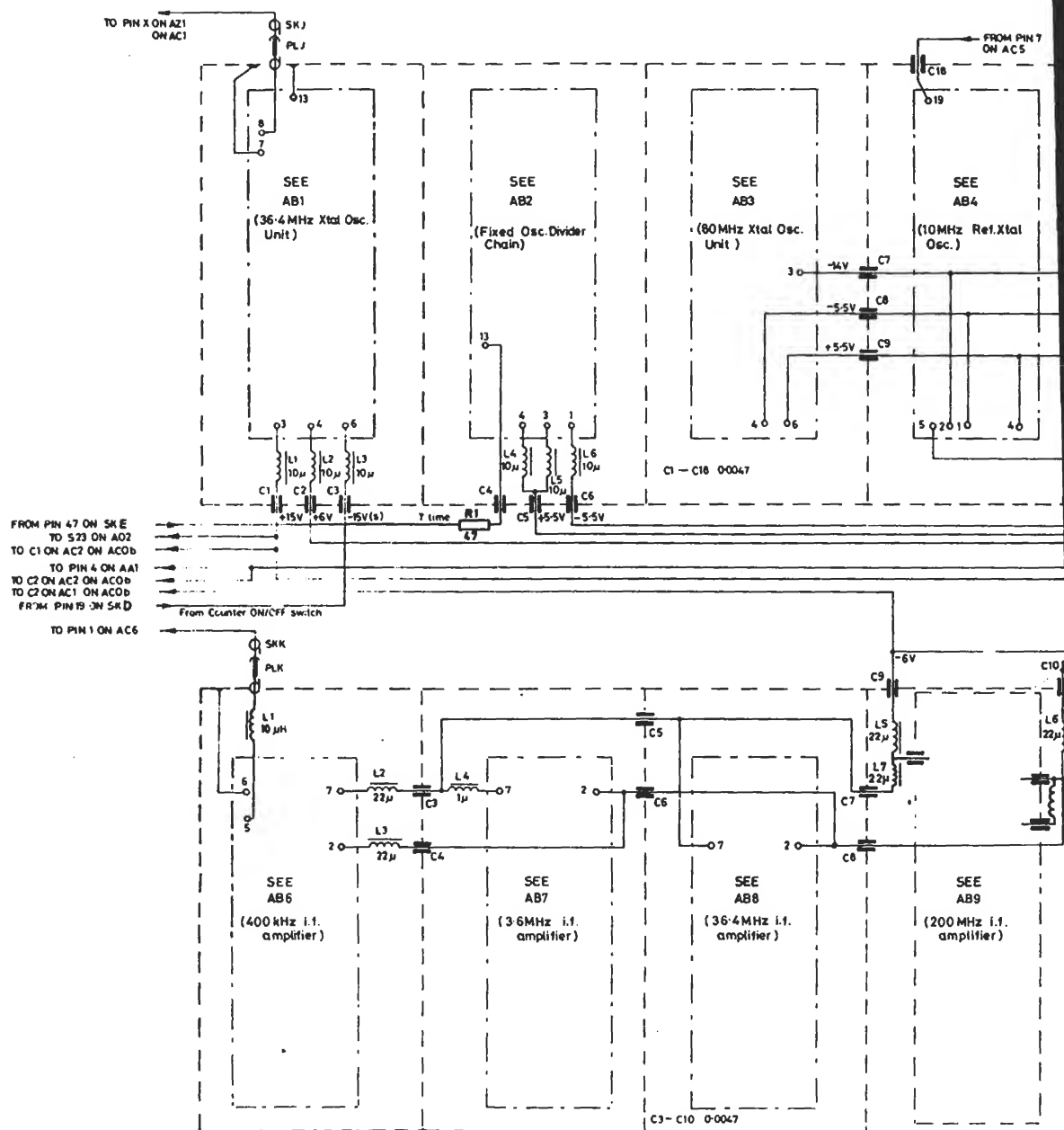


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Waveforms for AB5

TF 2370 controls - HORIZONTAL SCALE and RANGE : 10 MHz/DIV
FILTER BANDWIDTH : WIDE
COUNTER ON/OFF : ON





NOTE:- ALL OTHER INTERBOARD CONNECTIONS ARE SHOWN ON THEIR RESPECTIVE CIRCUIT DIAGRAMS.

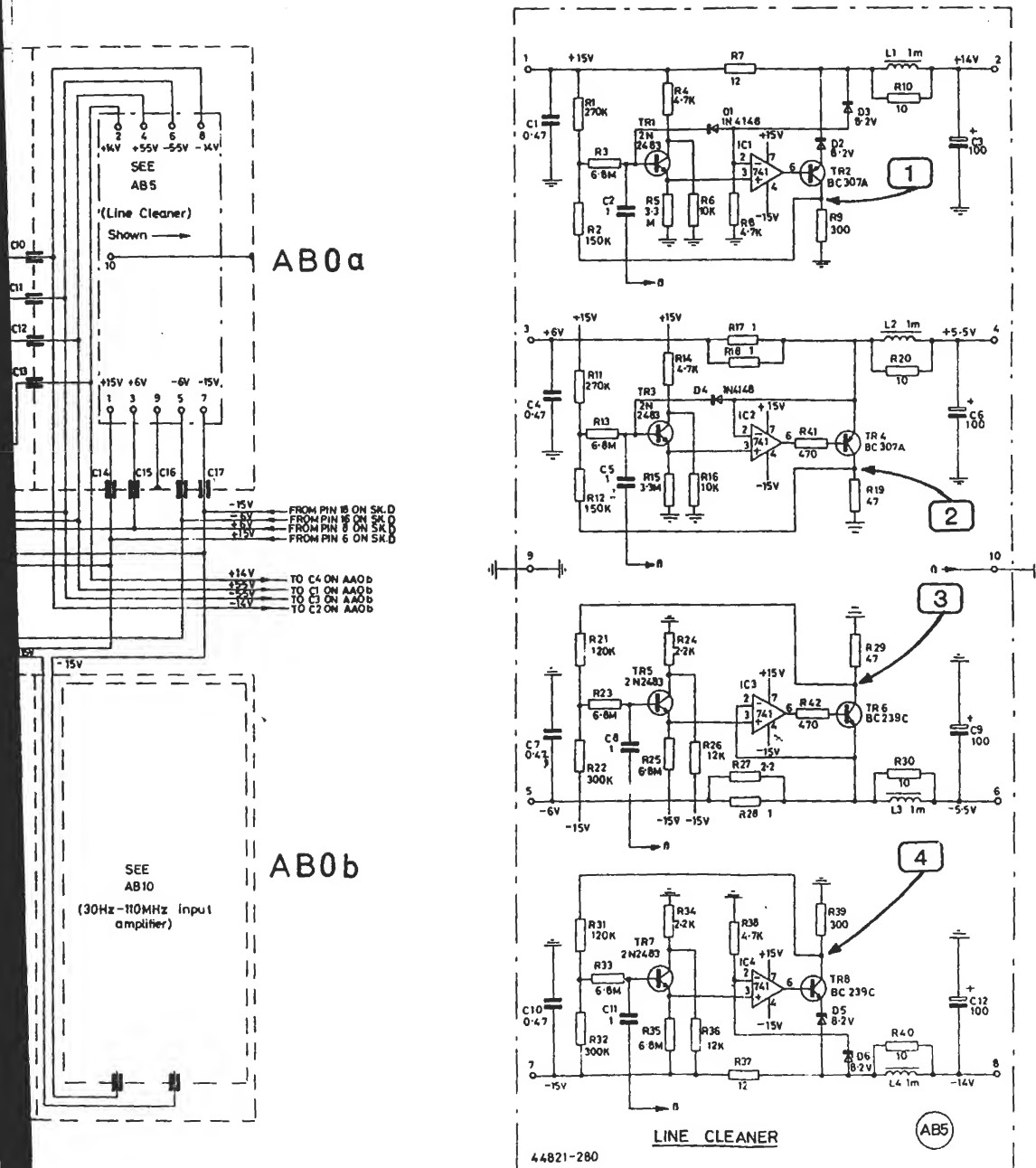
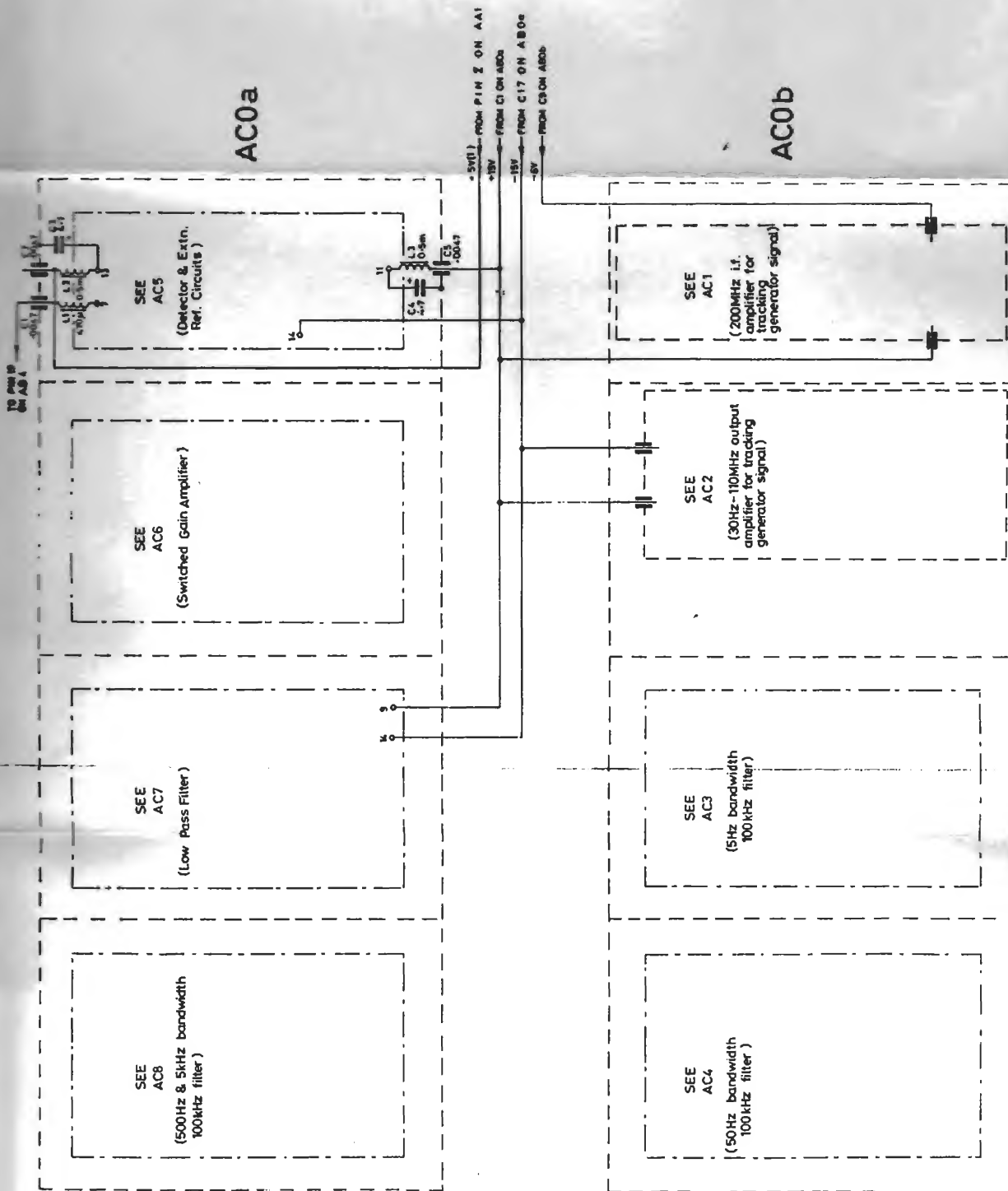
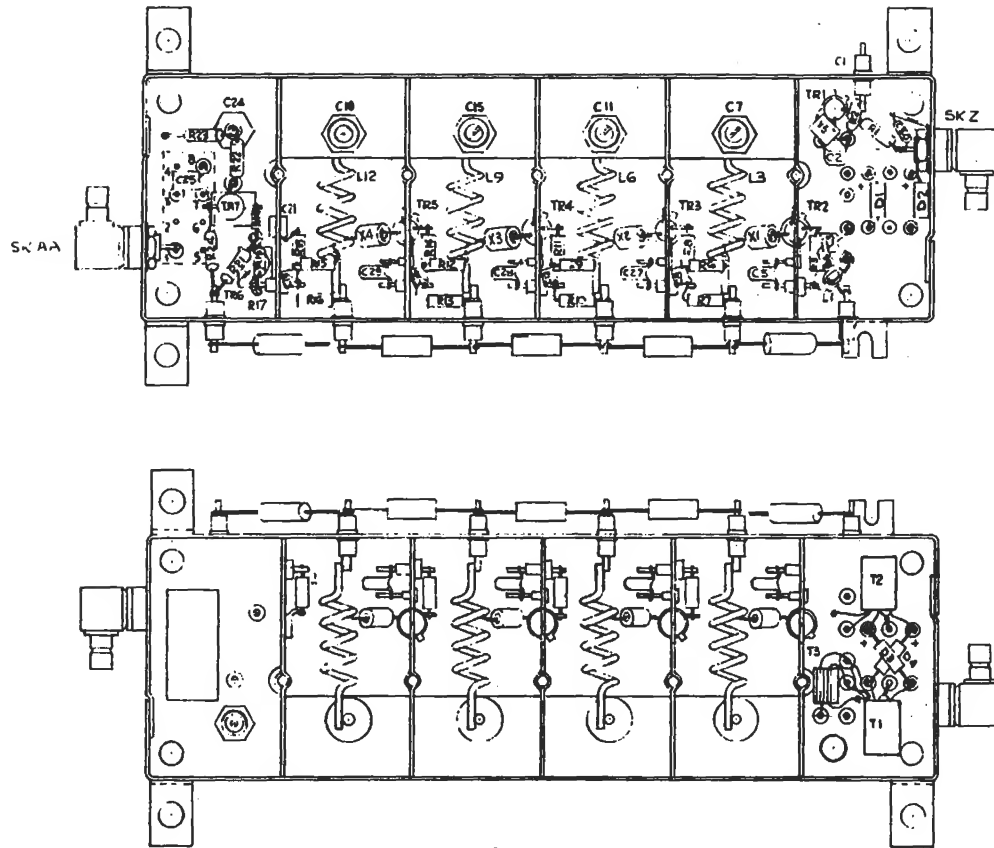


Fig. 7.5 AB tray interconnections and line cleaners AB5

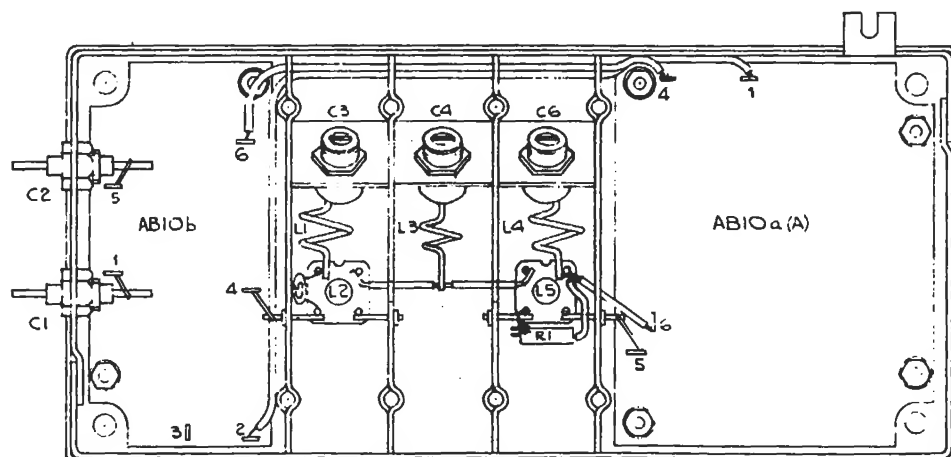


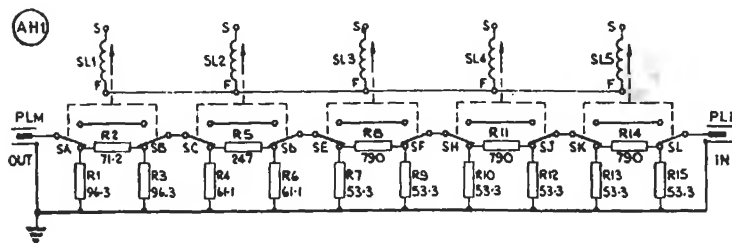
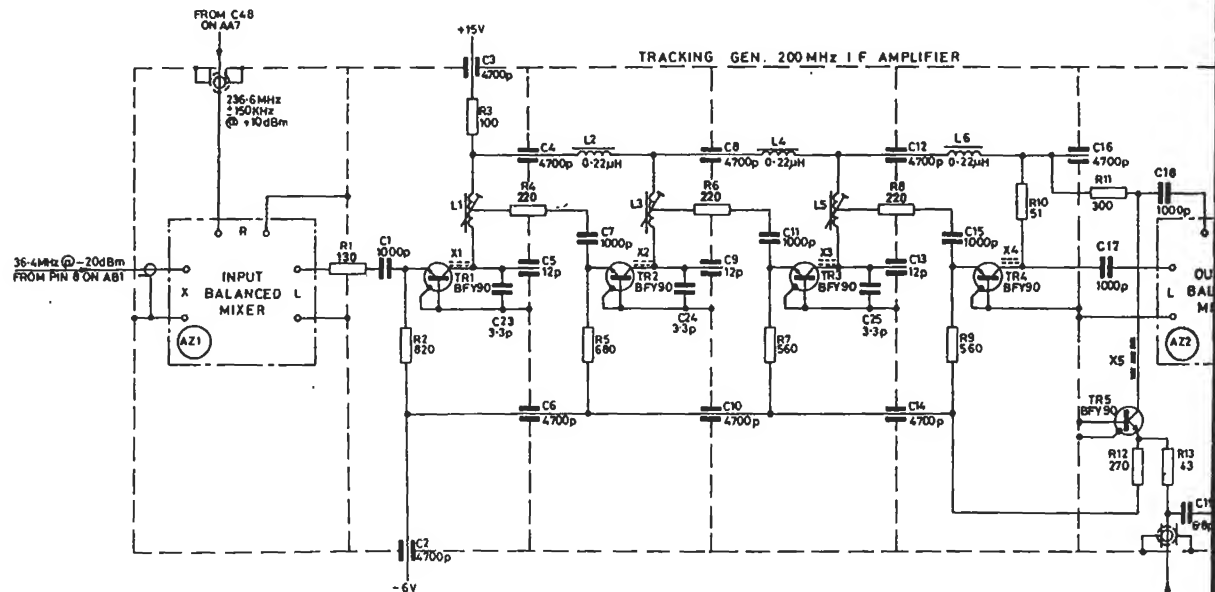
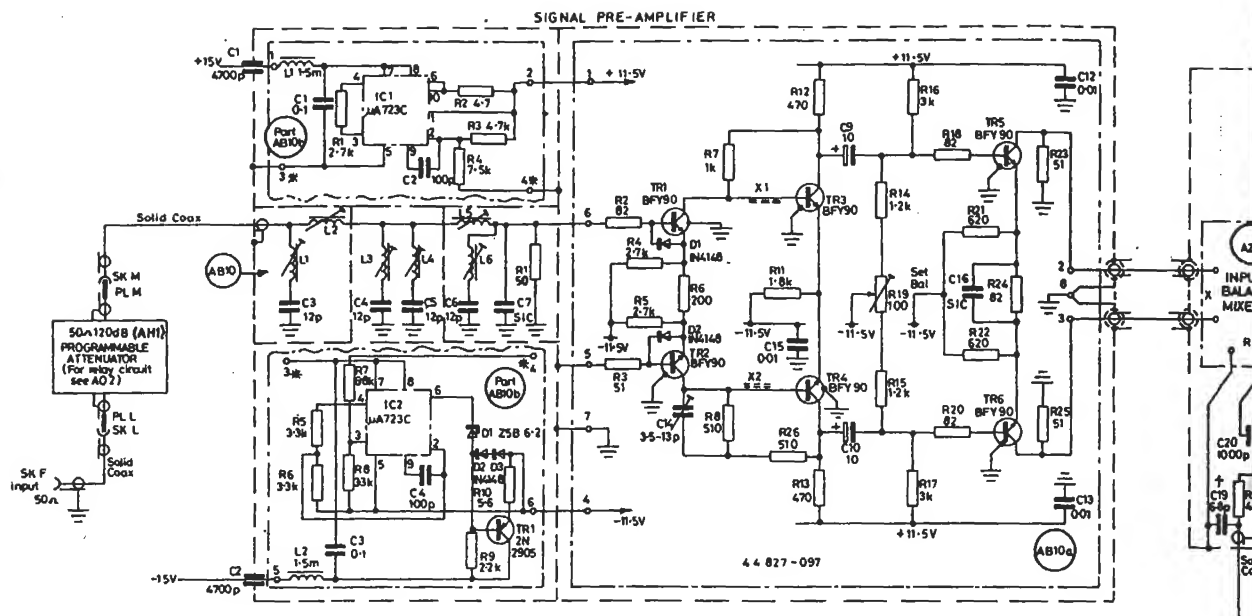
NOTE:-ALL OTHER INTERBOARD CONNECTIONS ARE SHOWN ON THEIR RESPECTIVE CIRCUIT DIAGRAMS

Layout of AB9



Layout of AB10 a



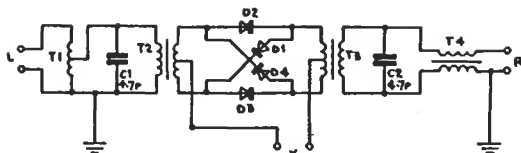


* INDICATES LEAD ROUTED VIA REAR PANEL PL & SK SEE AO1 P1

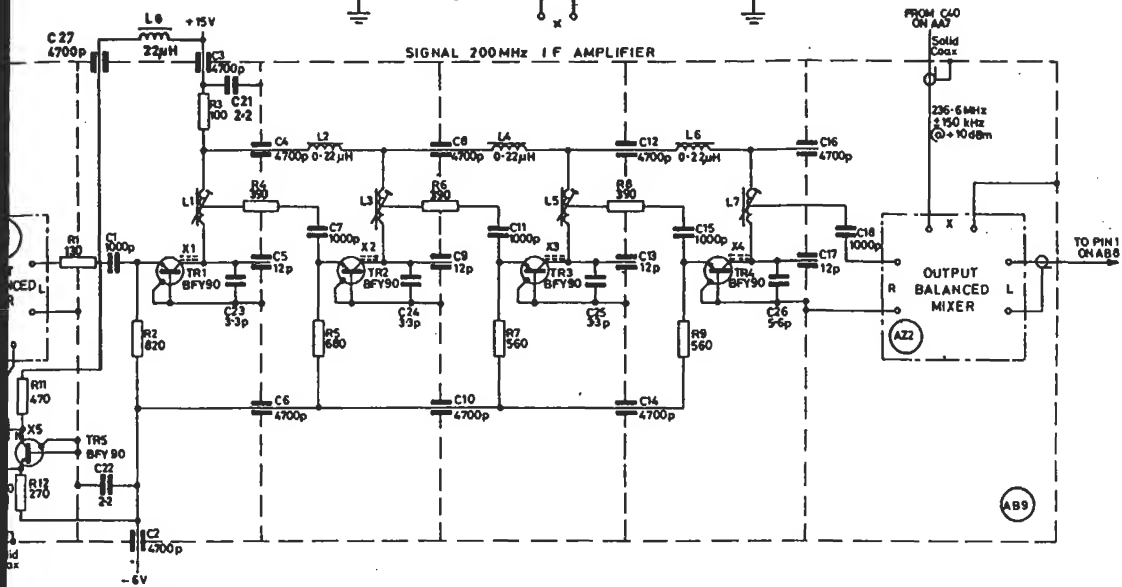
DRG. No Z44990-034N ISSUE 13

NOTE: SOME SCREW CORES ARE SEALED WITH WAX AND IF ADJUSTMENT IS NEEDED, TO AVOID DAMAGE TO THE CORE, IT IS NECESSARY TO REMOVE THE WAX.

(AZ1)



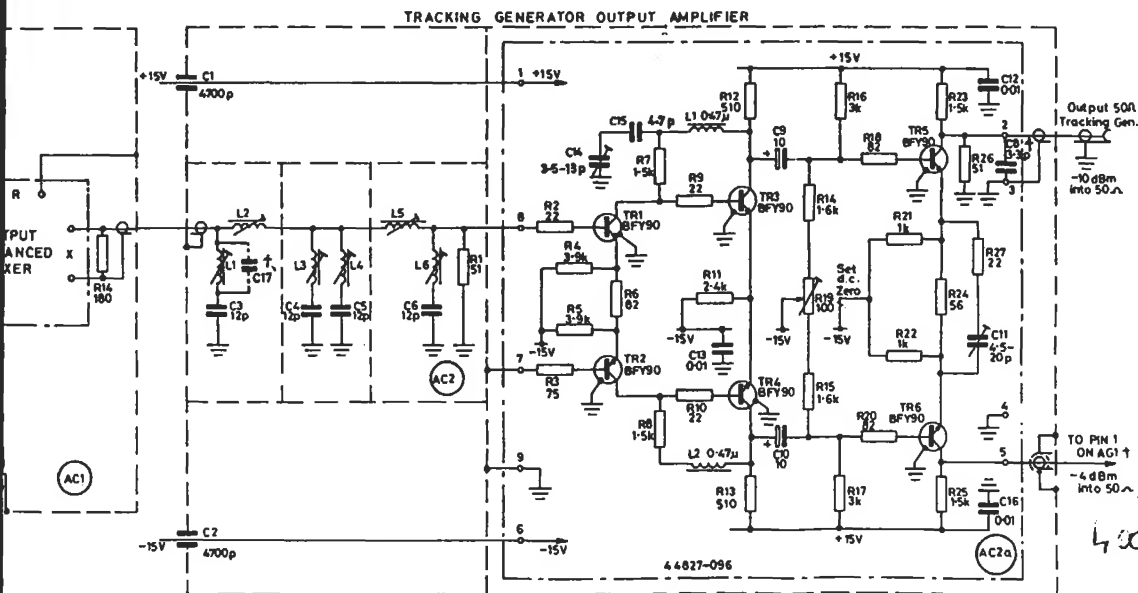
SIGNAL 200 MHz I F AMPLIFIER



200-310 MHz @ +10 dBm

FROM C40
ON AA5

TRACKING GENERATOR OUTPUT AMPLIFIER



200-310 MHz @ +10 dBm

FROM C48 ON AA5

356 ÷ 576 MHz

4.50 mVpp

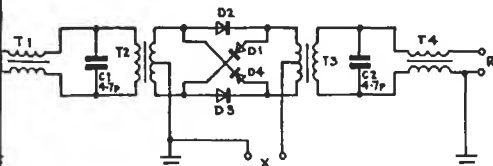
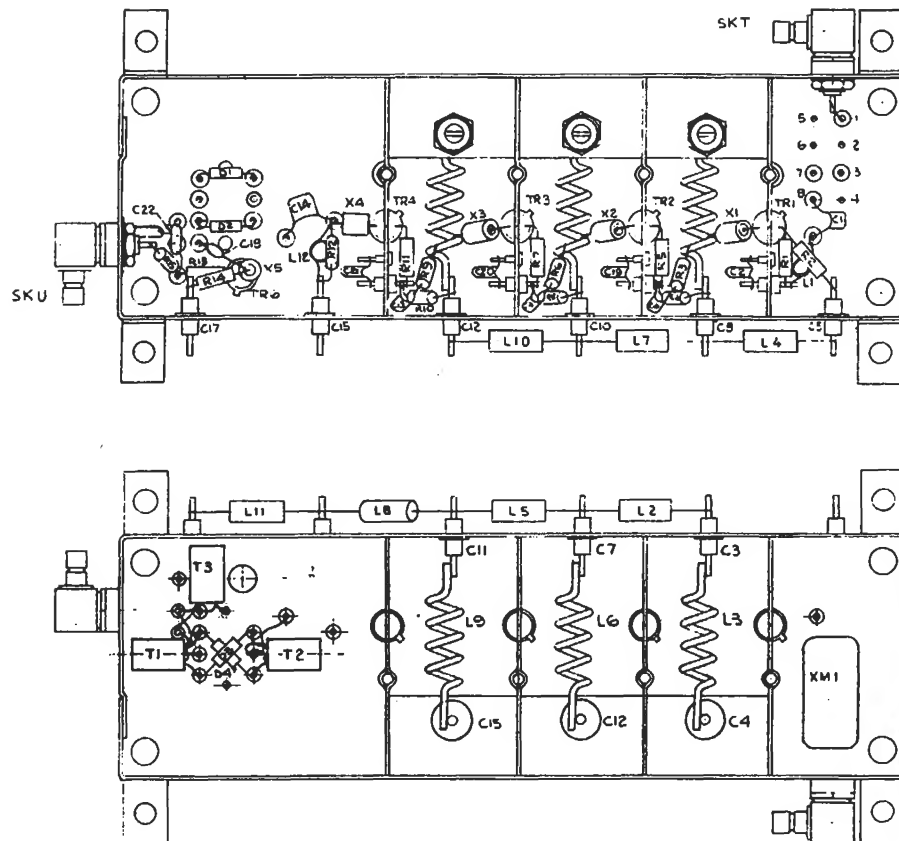
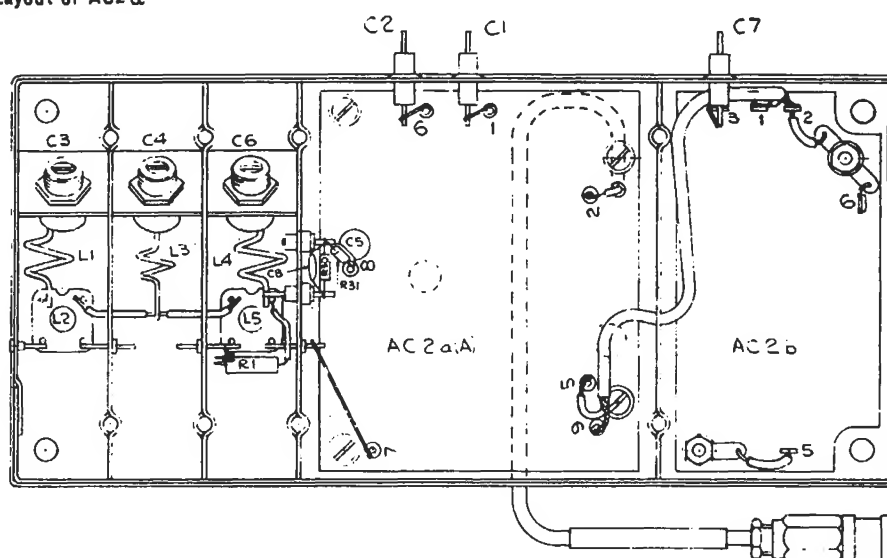


Fig. 7.7 Circuits: AB9, AB10, AC1, AC2 and AH1

Layout of AC1



Layout of AC2 a.

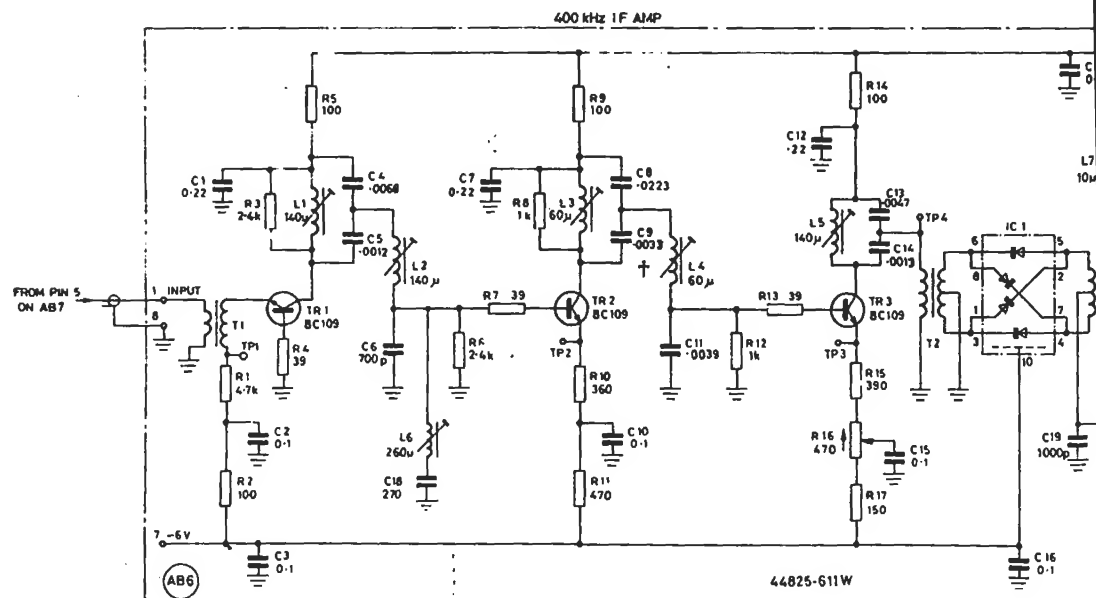
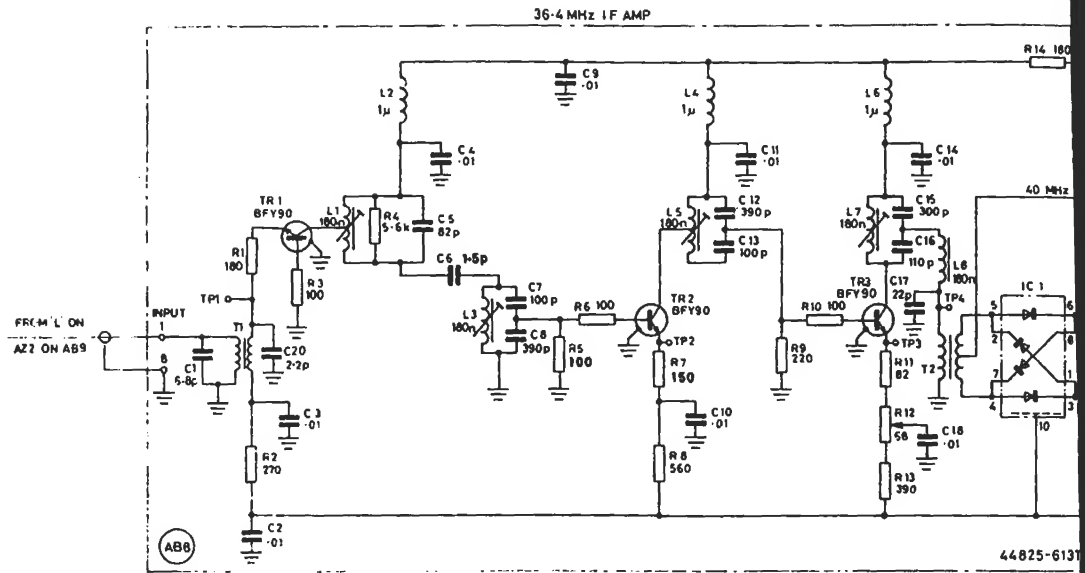


CALIBRATION TABLE

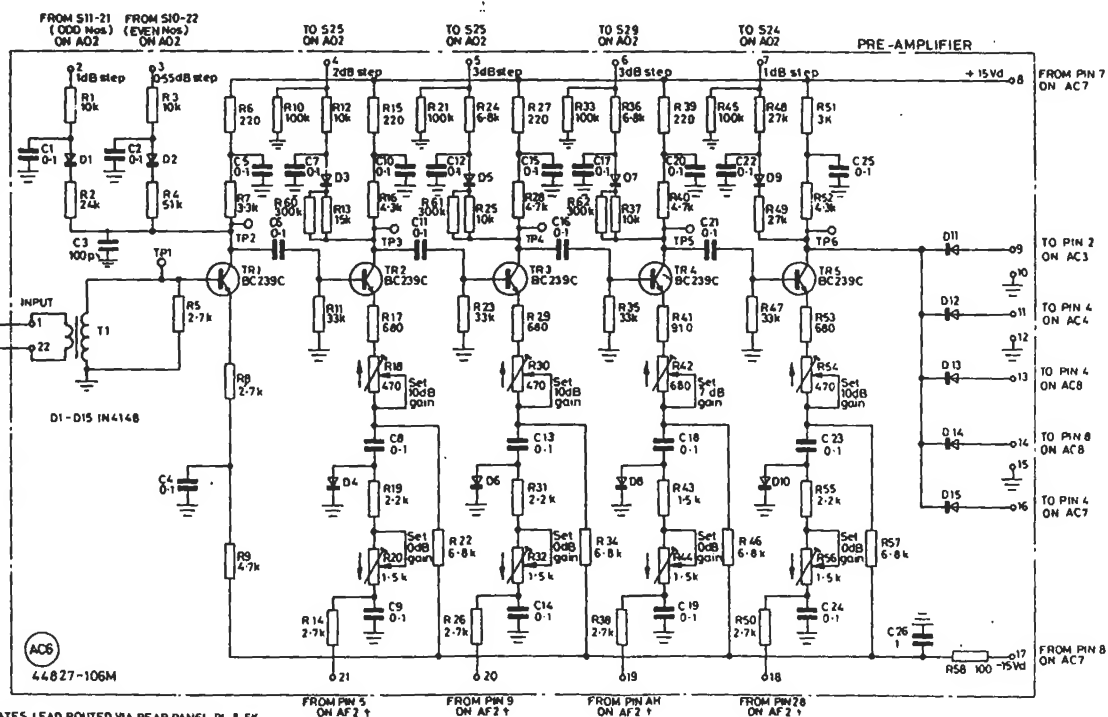
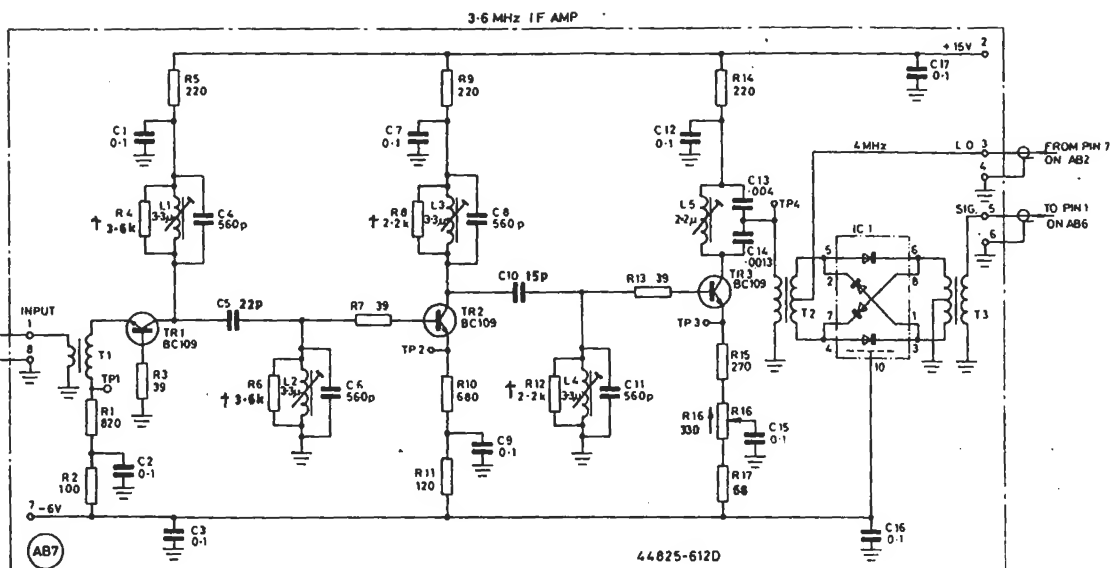
Valid for top of screen signal levels displayed on the
10 dB/DIV position using MANUAL mode.

Input sensitivity for top of screen	Input attenuator setting	Signal level from attenuator	Input amp & 360 MHz i.f. amp gain	Signal level at pin 1 of AB8, AB7, AB6 & AC6*	Gain from pin 1 to TP2 on AC6	Signal level at TP2 on AC6*	Gain from TP2 to TP6 on AC6	Gain from TP6 on AC6 to pin 10 of AC7	Signal level at pin 32 on AD1*	DC level at pin 4 of AB2	Filter bandwidth selected
+30 dBm	80dB 70dB 60dB 60dB	-50dBm -40dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
+20 dBm	70dB 60dB 50dB 50dB 50dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
+10 dBm	60dB 50dB 40dB 40dB 40dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
0 dBm	50dB 40dB 30dB 30dB 30dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-10 dBm	40dB 30dB 20dB 20dB 20dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-20 dBm	30dB 20dB 10dB 10dB 10dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-30 dBm	20dB 10dB 0dB 0dB 0dB	-50dBm -40dBm -30dBm -30dBm -30dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -17dBm (90mV) -17dBm (90mV) -17dBm (90mV)	x7.1 (+17dB)	64mV 200mV 640mV 640mV 640mV	0dB 0dB 0dB 10dB 17dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-40 dBm	10dB 0dB 0dB 0dB 0dB	-50dBm -40dBm -40dBm -40dBm -40dBm	+13dB	-37dBm (9mV) -27dBm (28.5mV) -27dBm (28.5mV) -27dBm (28.5mV) -27dBm (28.5mV)	x7.1 (+17dB)	64mV 200mV 200mV 200mV 200mV	0dB 0dB 10dB 20dB 27dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz
-50 dBm	0dB 0dB 0dB 0dB 0dB	-50dBm -50dBm -50dBm -50dBm -50dBm	+13dB	-37dBm (9mV) -37dBm (9mV) -37dBm (9mV) -37dBm (9mV) -37dBm (9mV)	x7.1 (+17dB)	64mV 64mV 64mV 64mV 64mV	0dB 10dB 20dB 30dB 37dB	40dB 30dB 20dB 10dB 3dB	6.4V	+2V d.c.	5Hz 50Hz 500Hz 5kHz 50kHz

* Voltages are peak to peak values



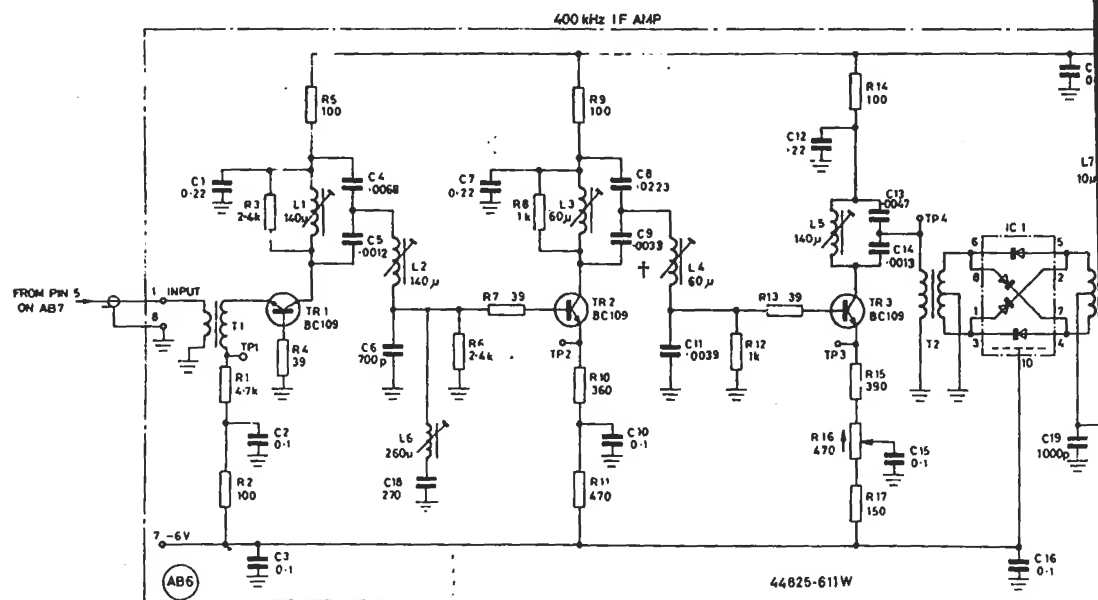
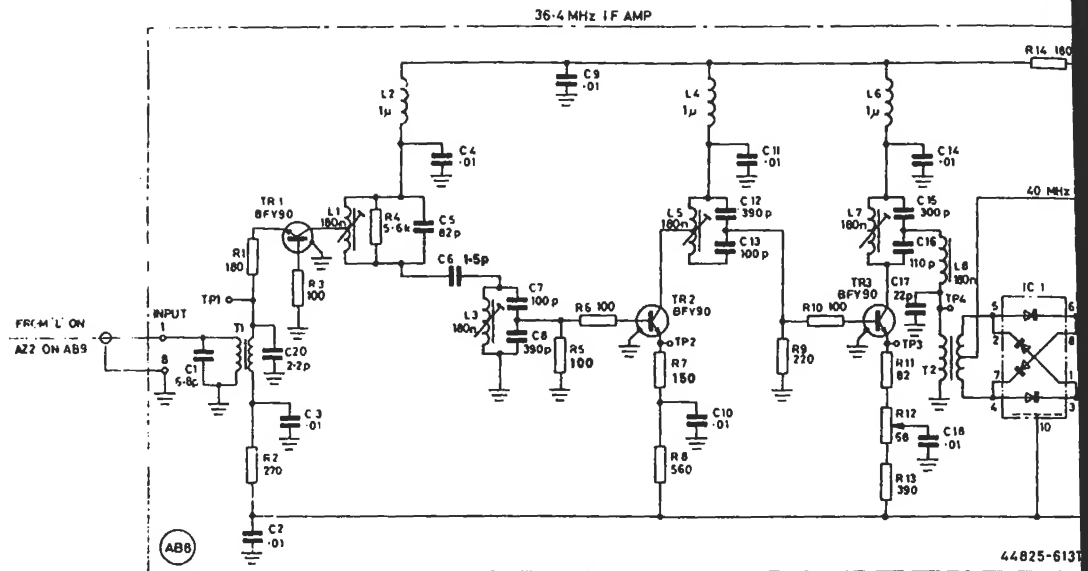
ORG N° Z44825-611W ISSUE 10



† INDICATES LEAD ROUTED VIA REAR PANEL PL & SK
SEE AO1 P1

NOTE : SOME SCREW CORES ARE SEALED WITH
WAX AND IF ADJUSTMENT IS NEEDED,
TO AVOID DAMAGE TO THE CORE, IT
IS NECESSARY TO REMOVE THE WAX.

Fig. 7.8 Circuits: AC6, AB6, AB7 and AB8



DRG N° Z44825-611W ISSUE 10

Waveforms for AB1, AB2, AB3 and AB4

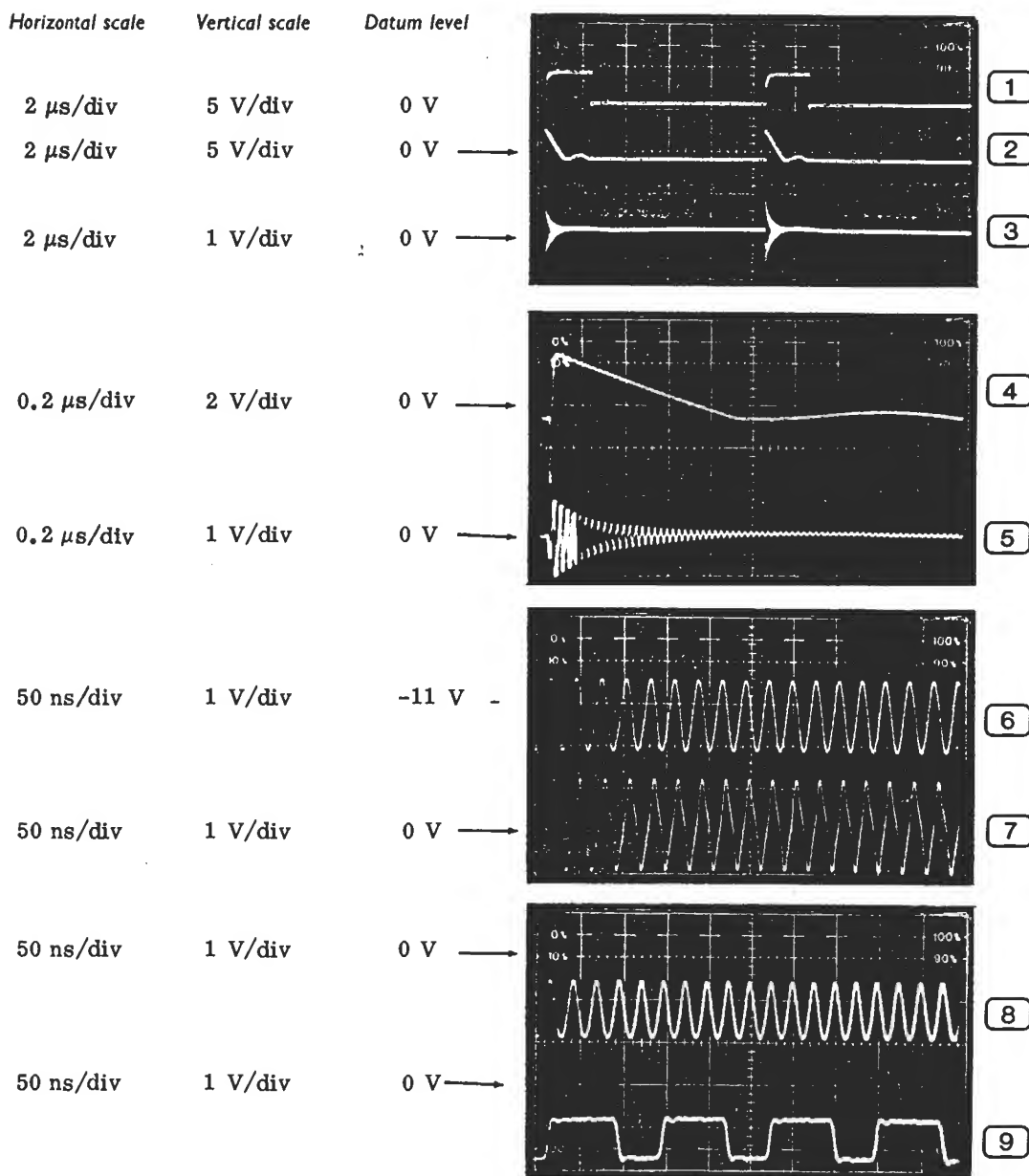
Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - HORIZONTAL SCALE and RANGE : 10 MHz/DIV
FILTER BANDWIDTH : WIDE

For (27), feed a 1 MHz 1 V p-p signal to the EXTERNAL STANDARD INPUT.

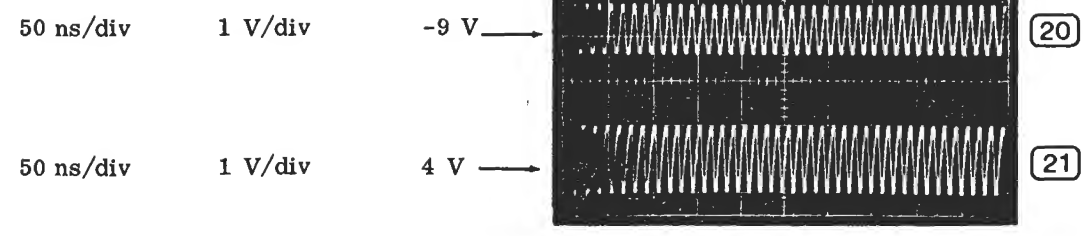
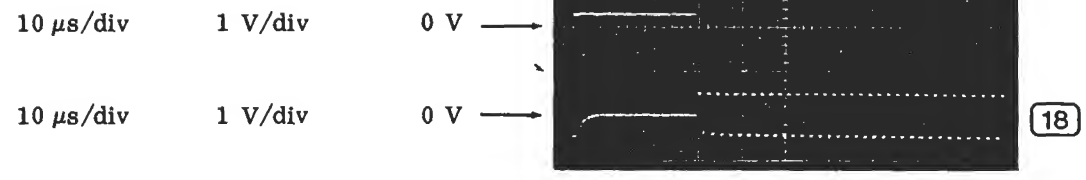
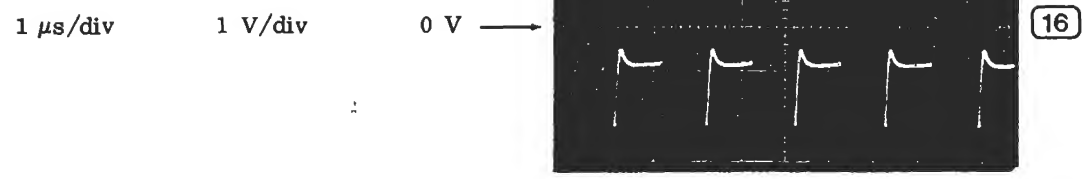
Oscilloscope triggering - (2) to (5) from (1) (a.c. positive)

(10) to (13) from (14) (a.c. positive)



10
 11
 12
 13

} NOT USED



5 μ s/div 2 V/div

5 μ s/div 2 V/div

5 μ s/div 2 V/div

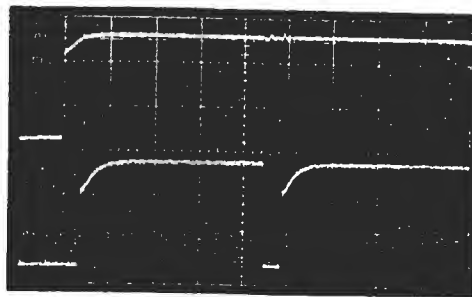
5 μ s/div 2 V/div

5 μ s/div 2 V/div

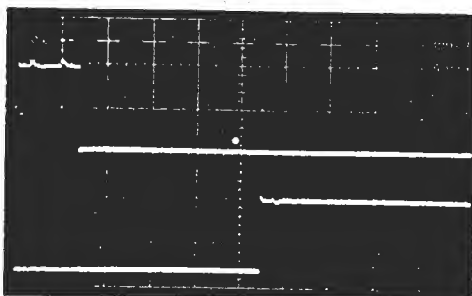
5 μ s/div 2 V/div

5 μ s/div 2 V/div

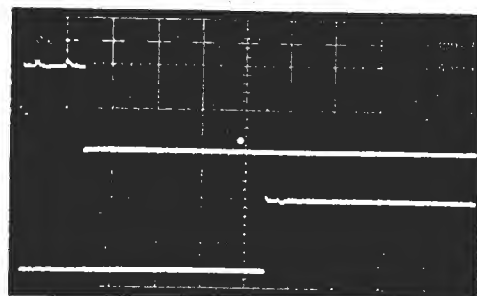
5 μ s/div 2 V/div



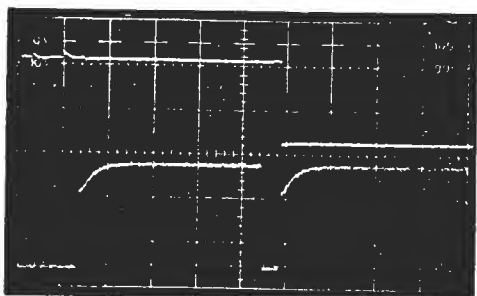
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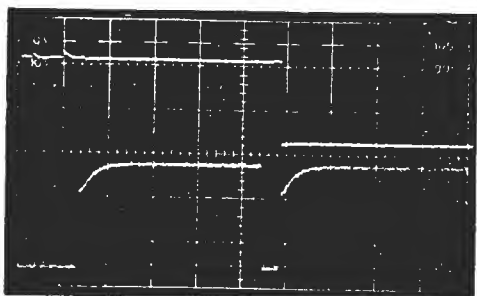
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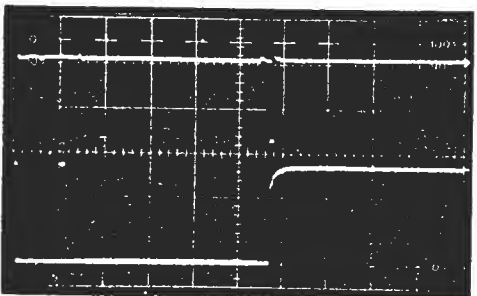
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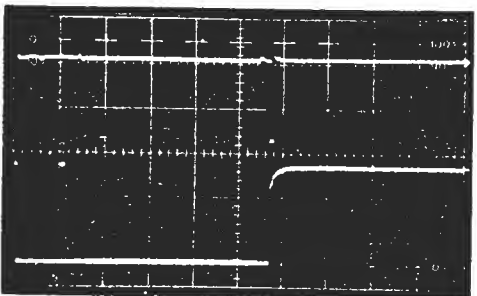
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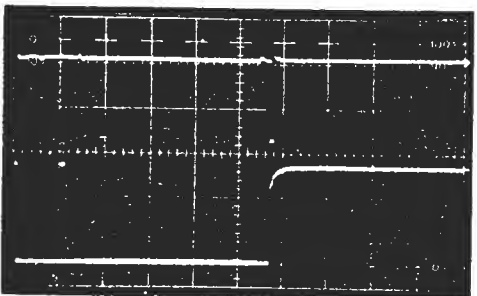
21



22

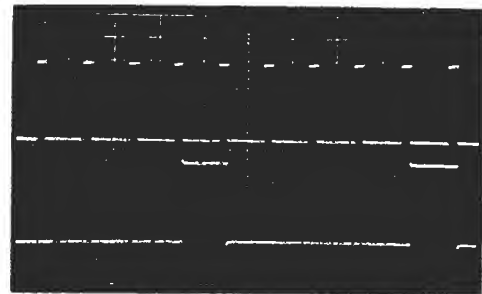


23



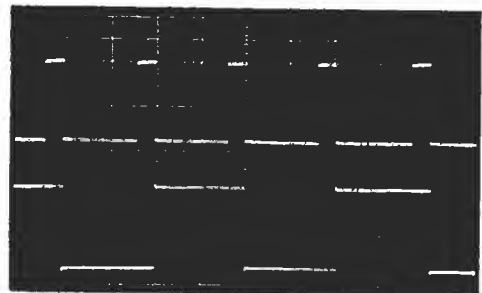
24

0.2 ms/div 2 V/div



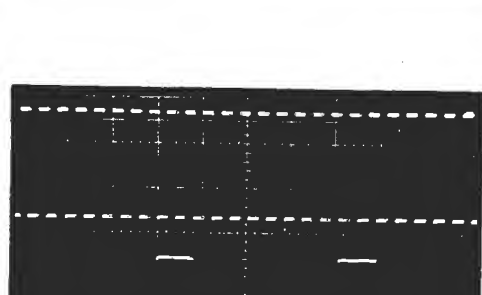
8

0.2 ms/div 2 V/div



9

0.5 ms/div 2 V/div



10

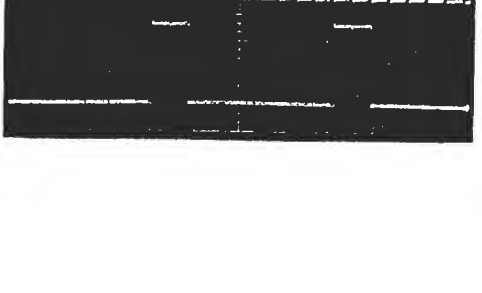
0.5 ms/div 2 V/div



11

5 ms/div
50 ms/div
0.5 s/div
50 μs/div
0.5 ms/div

2 V/div



12

13

14

15

16

17

18

19

20

21

5 ms/div
50 ms/div
0.5 s/div
50 μs/div
0.5 ms/div

2 V/div

5 μs/div 2 V/div



22

10 μs/div 2 V/div

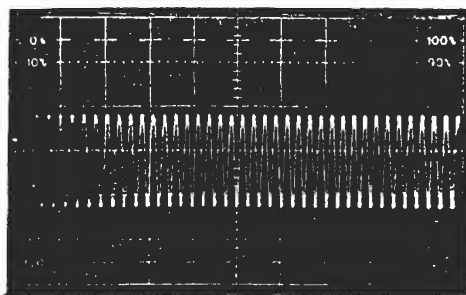
23

NOT
USED

50 ns/div

0.5 V/div

3 V →

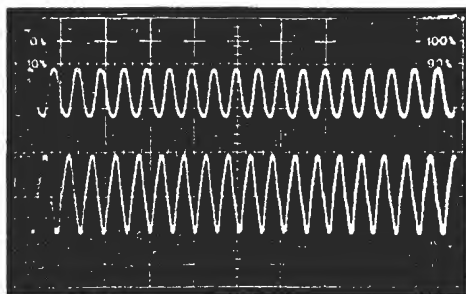


22

50 ns/div

1 V/div

0 V →

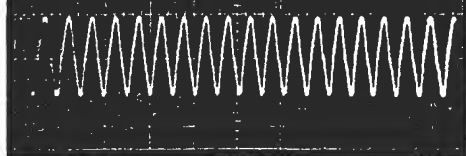


23

50 ns/div

1 V/div

0 V →

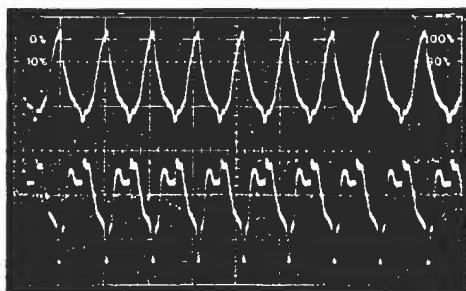


24

0.1 μs/div

0.2 V/div

-2 V →

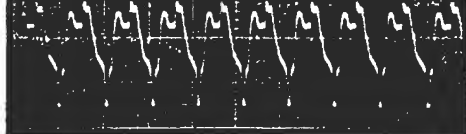


25

0.1 μs/div

0.2 V/div

0 V →

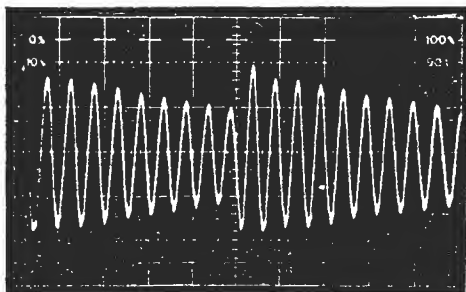


26

0.2 μs/div

0.1 V/div

0 V -

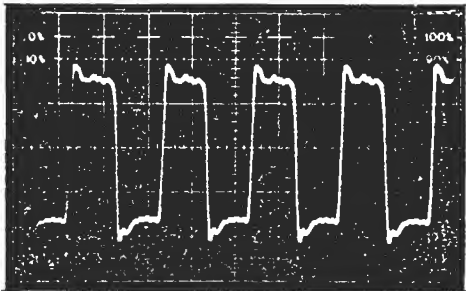


27

50 ns/div

0.2 V/div

-3 V

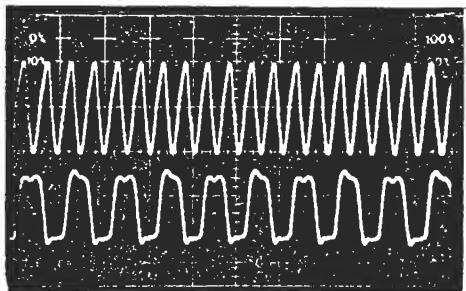


28

50 ns/div

0.5 V/div

-1 V →



29

50 ns/div

0.5 V/div

-1 V →

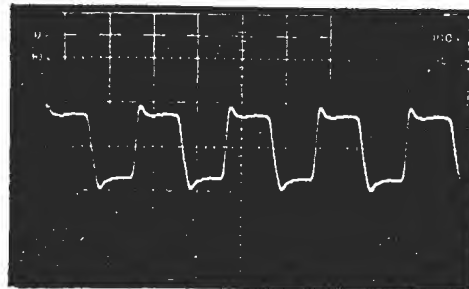


30

50 ns/div

0.5 V/div

0 V →

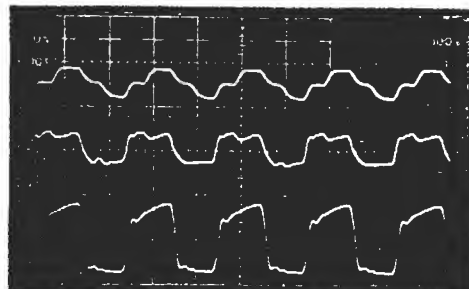


31

50 ns/div

0.5 V/div

0 V →

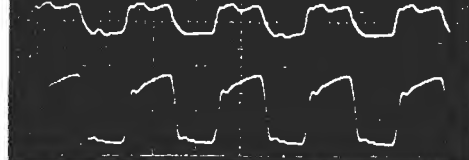


32

50 ns/div

0.5 V/div

0 V →

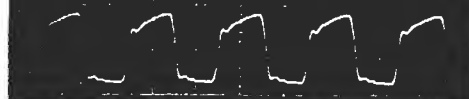


33

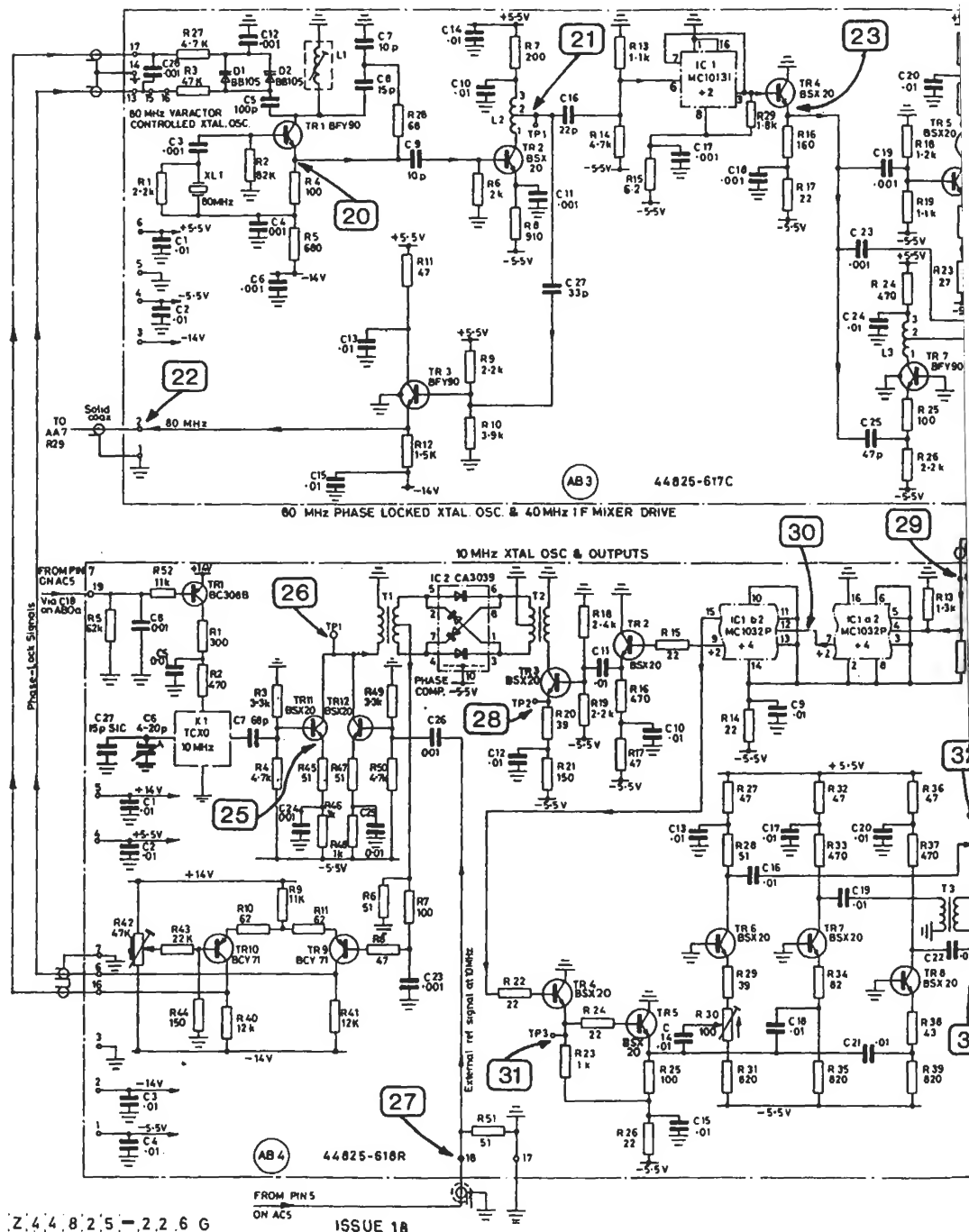
50 ns/div

0.5 V/div

0 V →



34



NOTE: SOME SCREW CORES ARE SEALED WITH WAX AND IF ADJUSTMENT NEEDED, TO AVOID DAMAGE TO THE CORE, IT IS NECESSARY TO REMOVE THE WAX.

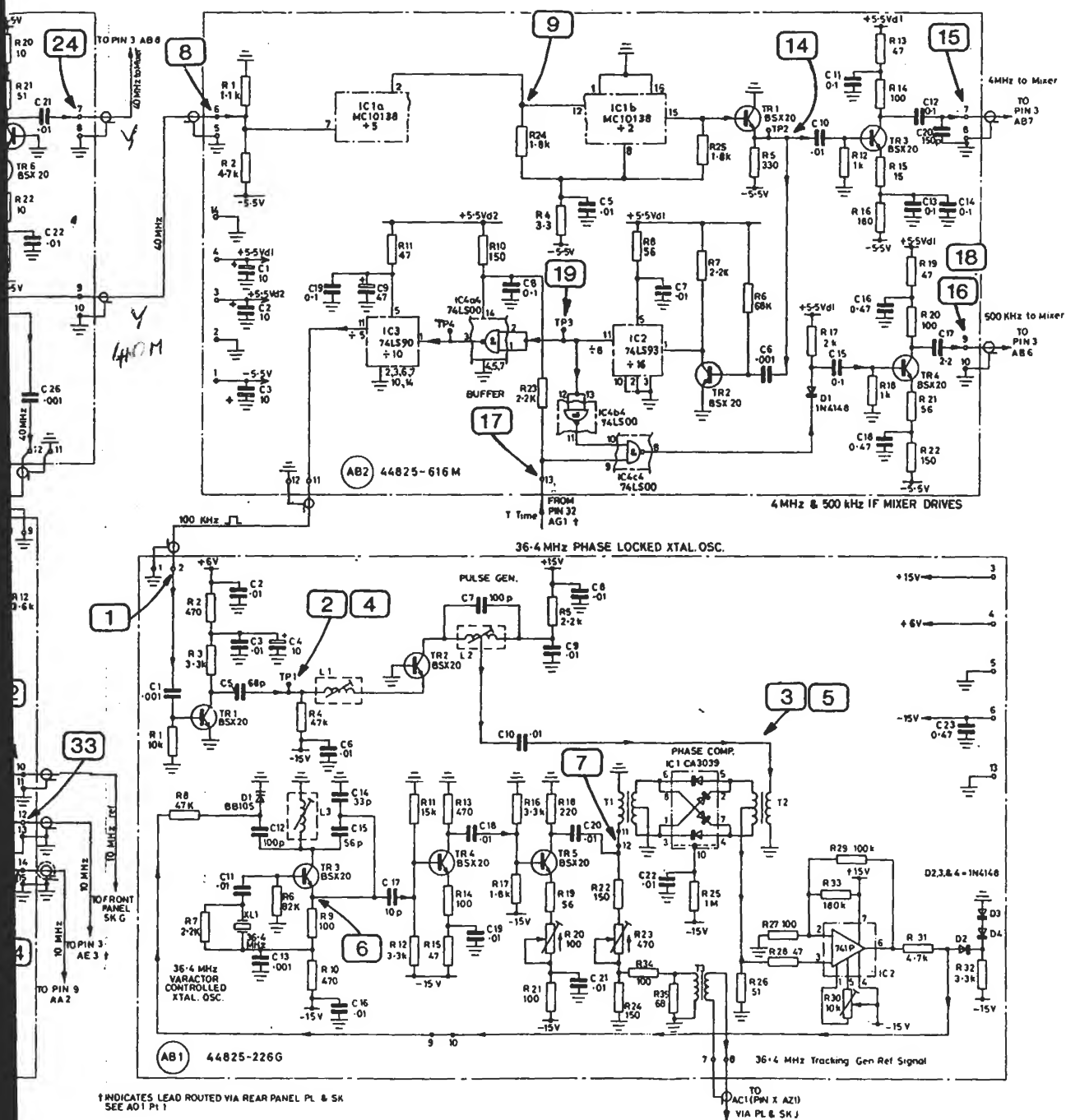


Fig. 7.9 Circuits: AB1, AB2, AB3 and AB4

Waveforms for AA1

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

HORIZONTAL SCALE and RANGE : (1) to (5) 10 MHz/DIV
(6) 10 kHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : (1) to (5) LH

(6) CENTRE

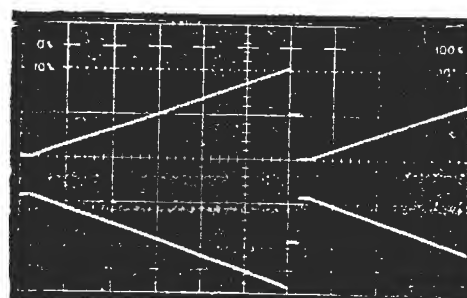
REFERENCE FREQUENCY 0-110 MHz : Fully counter-clockwise

REFERENCE FREQUENCY ± 70 kHz : Fully counter-clockwise

Horizontal scale Vertical scale Datum level

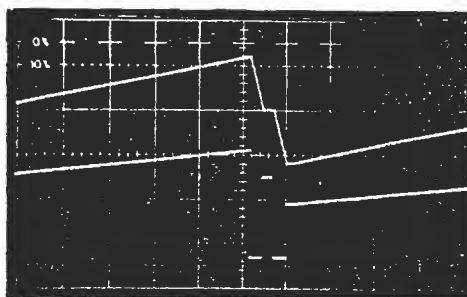
20 ms/div 5 V/div 0 V

20 ms/div 5 V/div 0 V

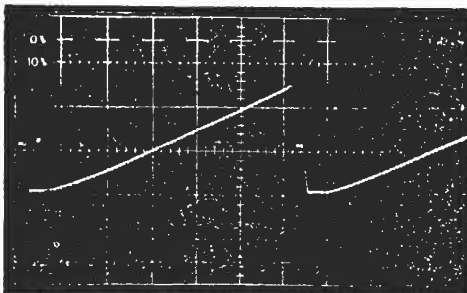


10 ms/div 5 V/div 0 V

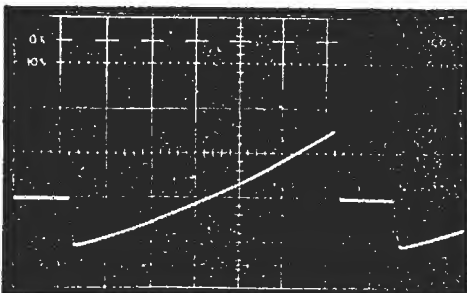
10 ms/div 10 V/div 0 V

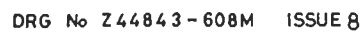


20 ms/div 5 V/div 0 V



20 ms/div 1 V/div 0 V





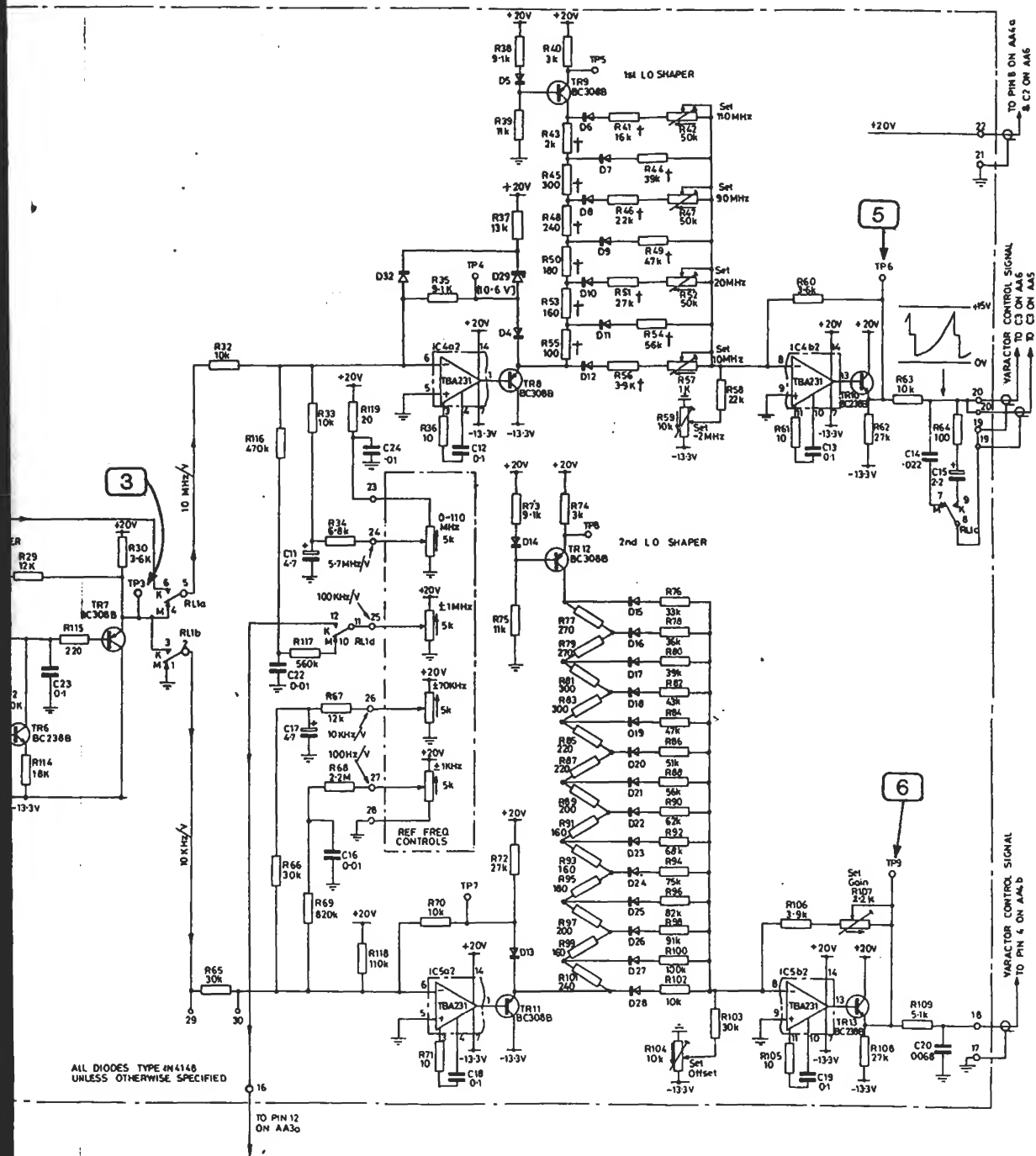
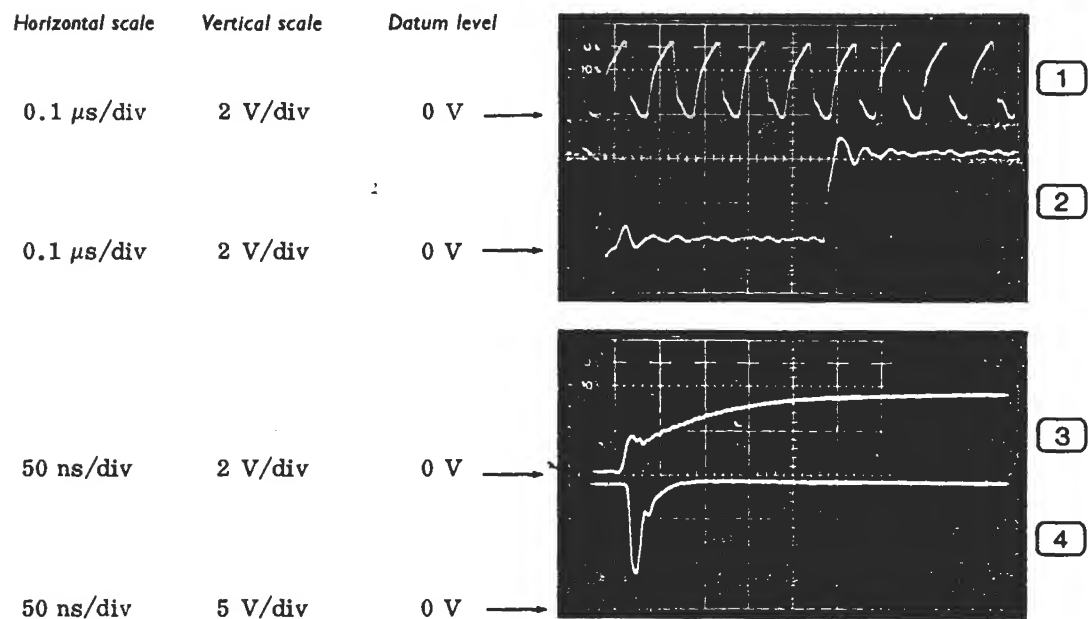


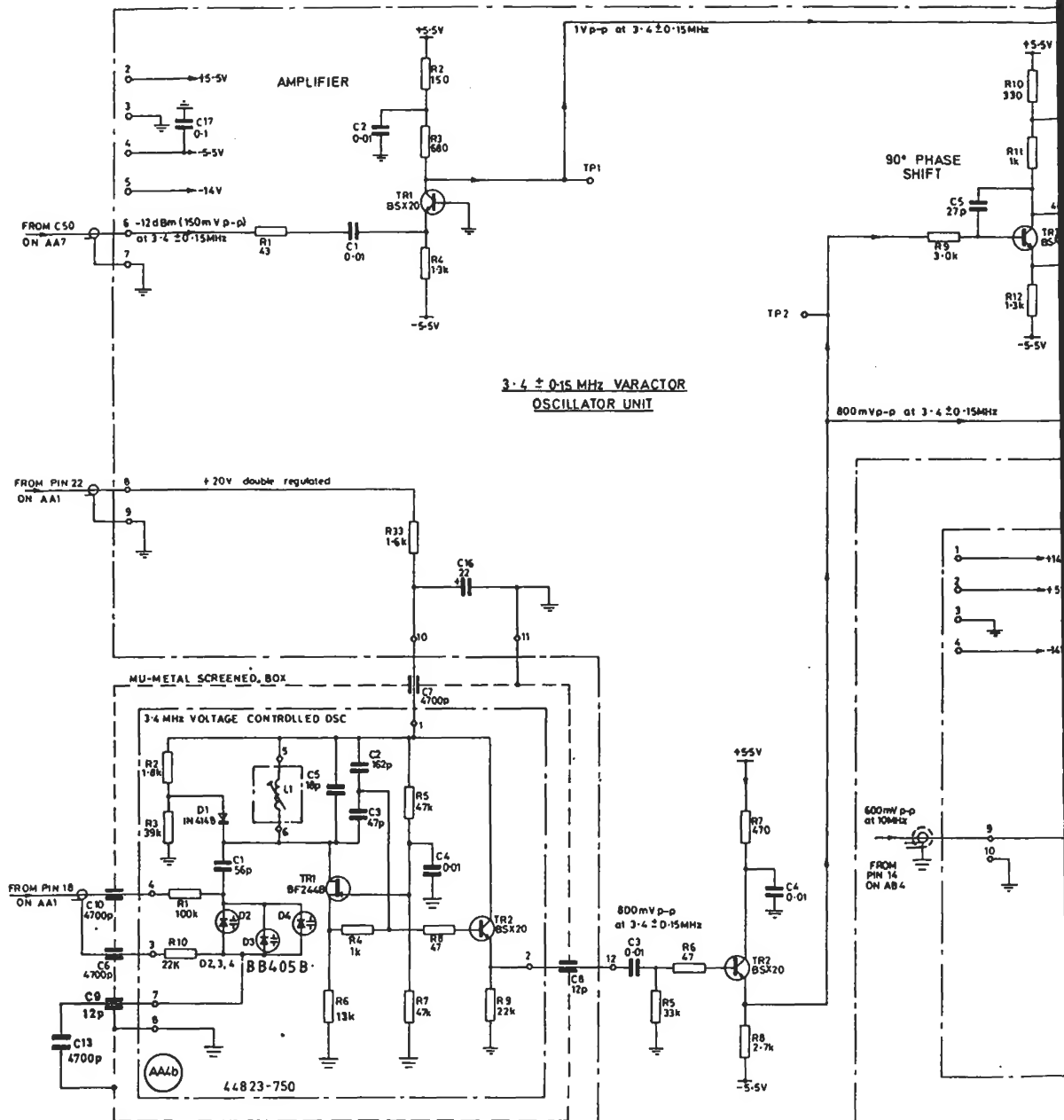
Fig. 7.10 Sweep shaper and local regulator AA1

Waveforms for AA2 and AA4

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO
HORIZONTAL SCALE and RANGE : 10 MHz/DIV
FILTER BANDWIDTH : WIDE





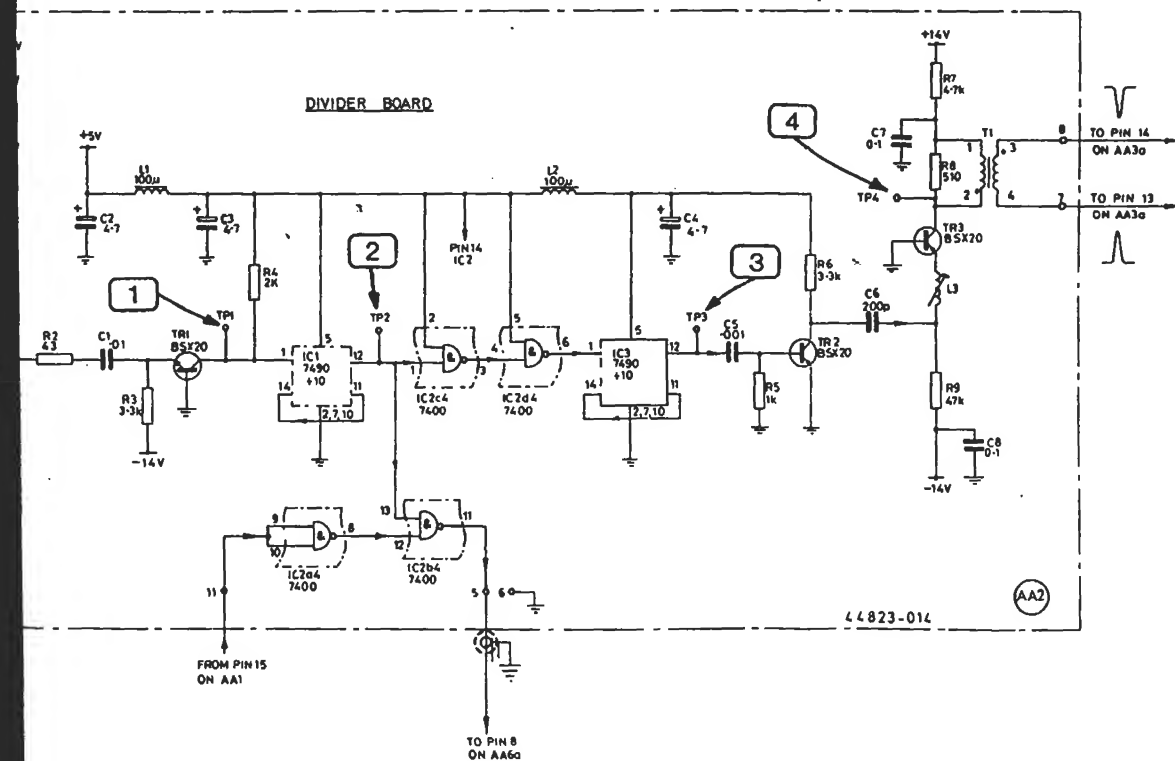
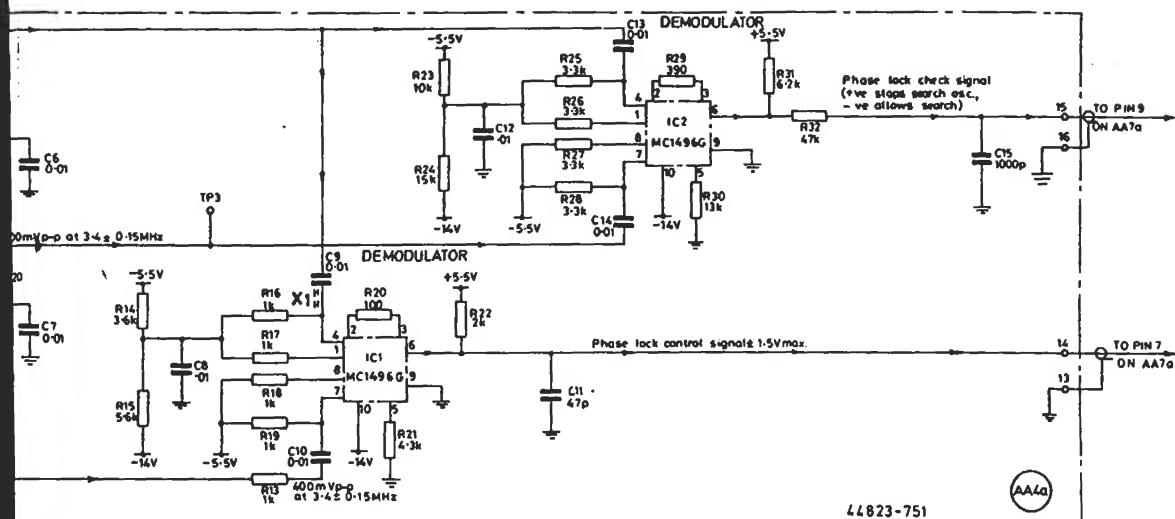


Fig. 7.11 Circuits: AA2, AA4

Waveforms for AA3

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

HORIZONTAL SCALE and RANGE : 10 MHz/DIV

FILTER BANDWIDTH : WIDE

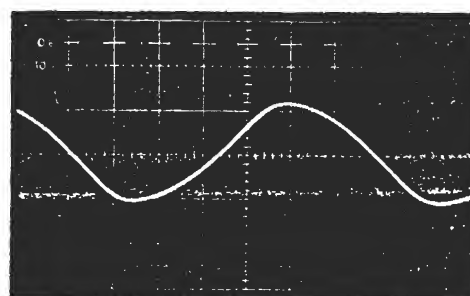
For (1), connect TP5 to earth.

Horizontal scale Vertical scale Datum level

20 ms/div

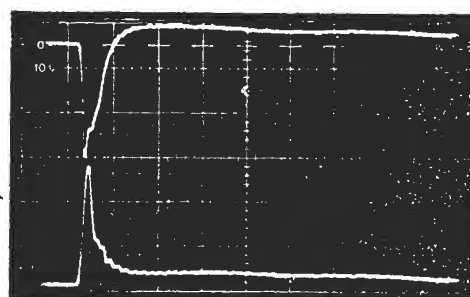
1 V/div

0 V →



50 ns/div

2 V/div



50 ns/div

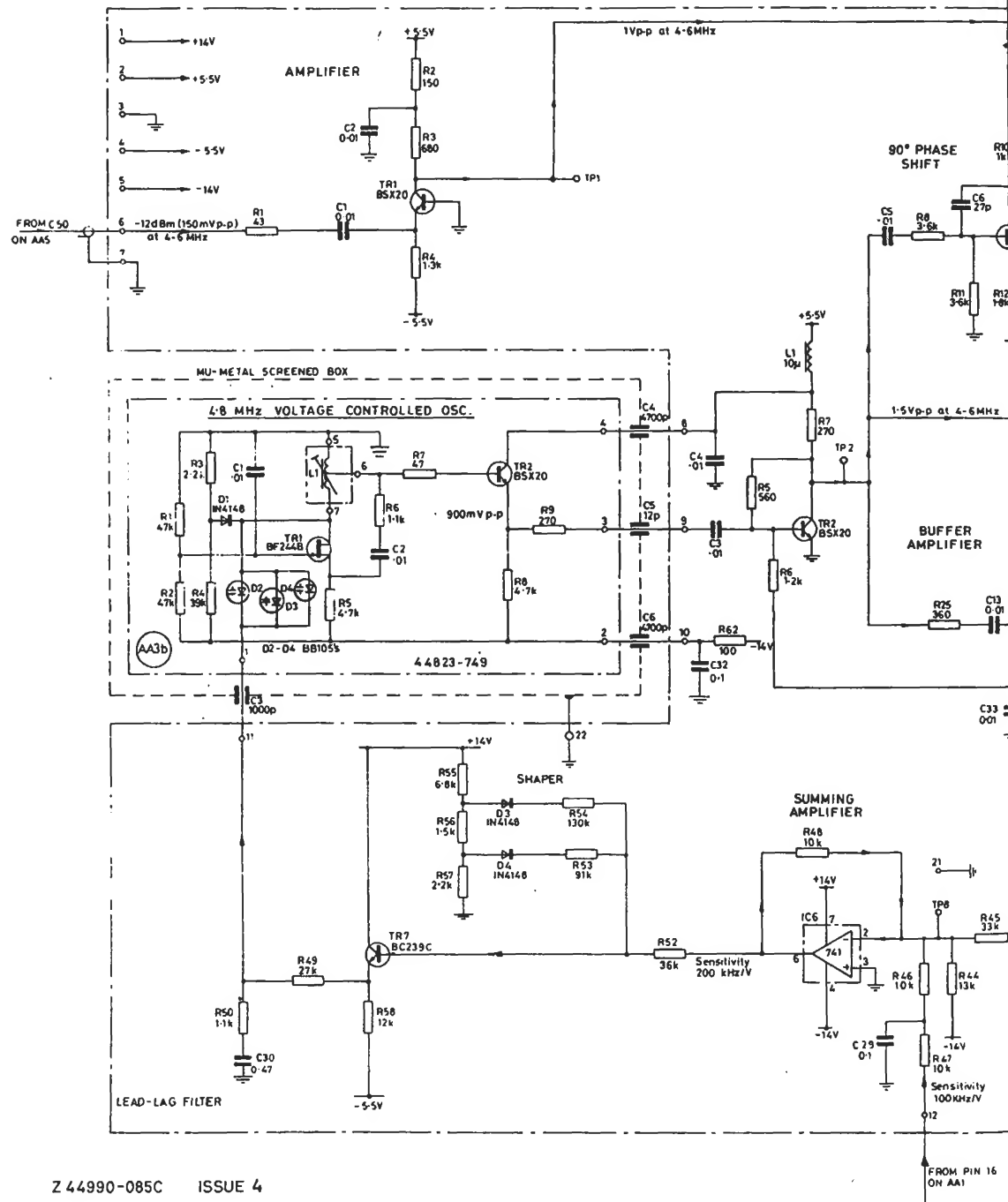
2 V/div



1

2

3



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FROM PIN 16
ON AA1

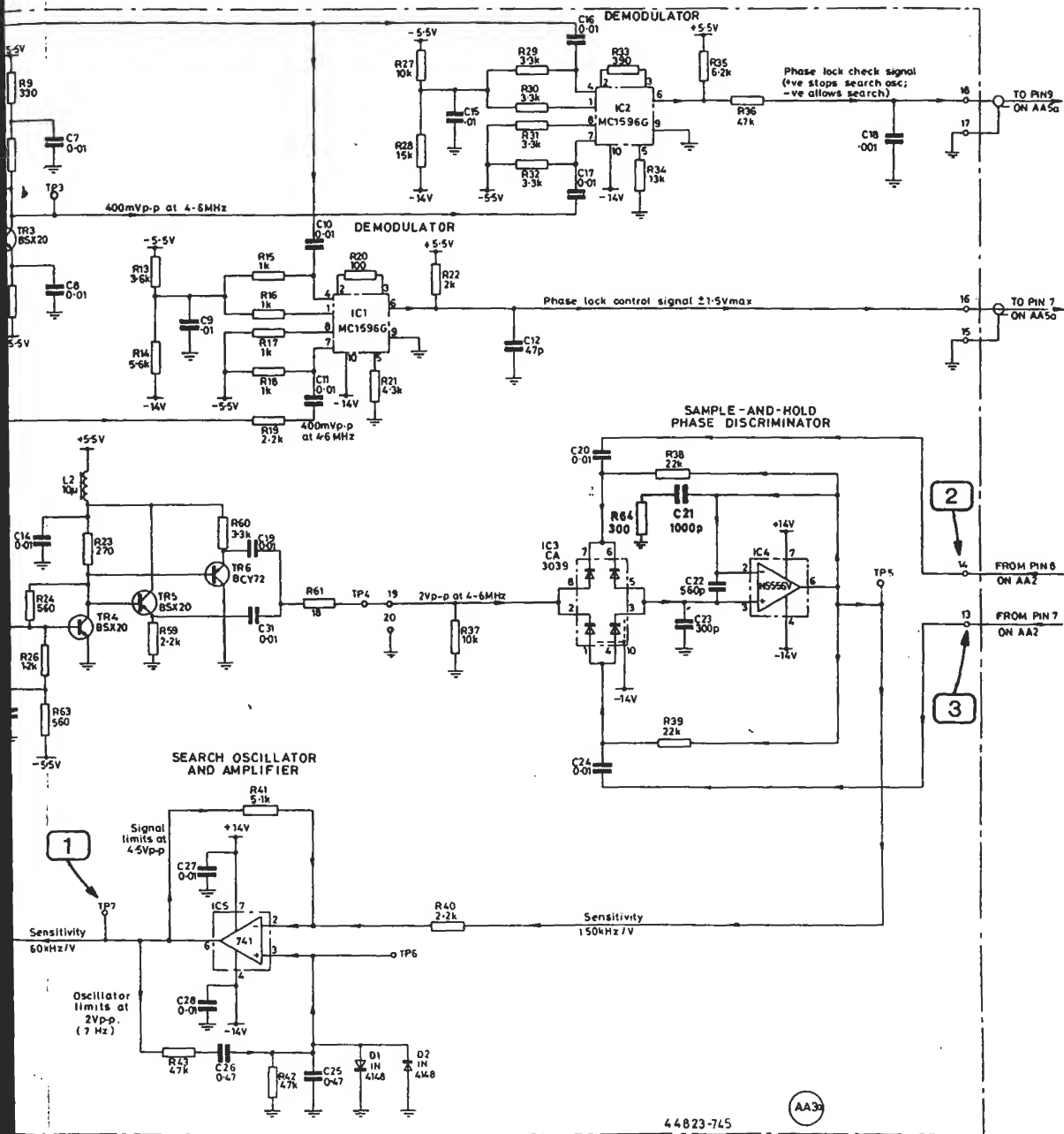
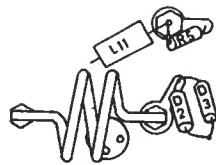
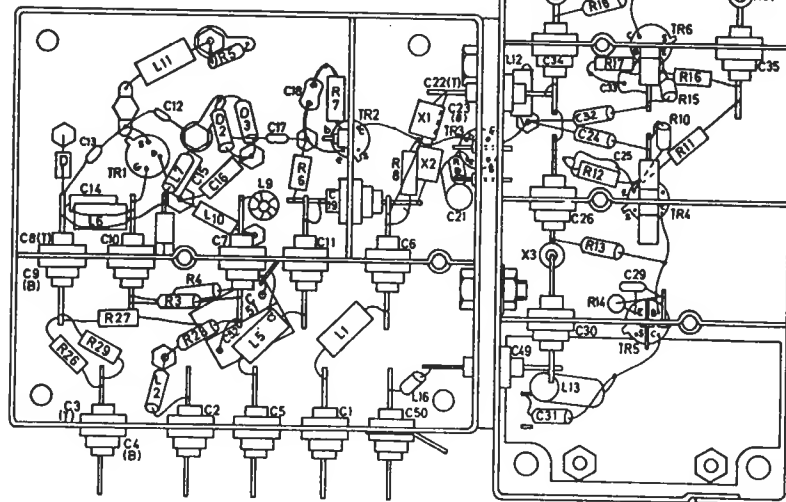


Fig. 7.12 4.8 MHz interpolation oscillator AA3

Layout of AA5



SCRAP VIEW SHOWING POSITION
OF L8



TPC 3096

Waveforms for AA5

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

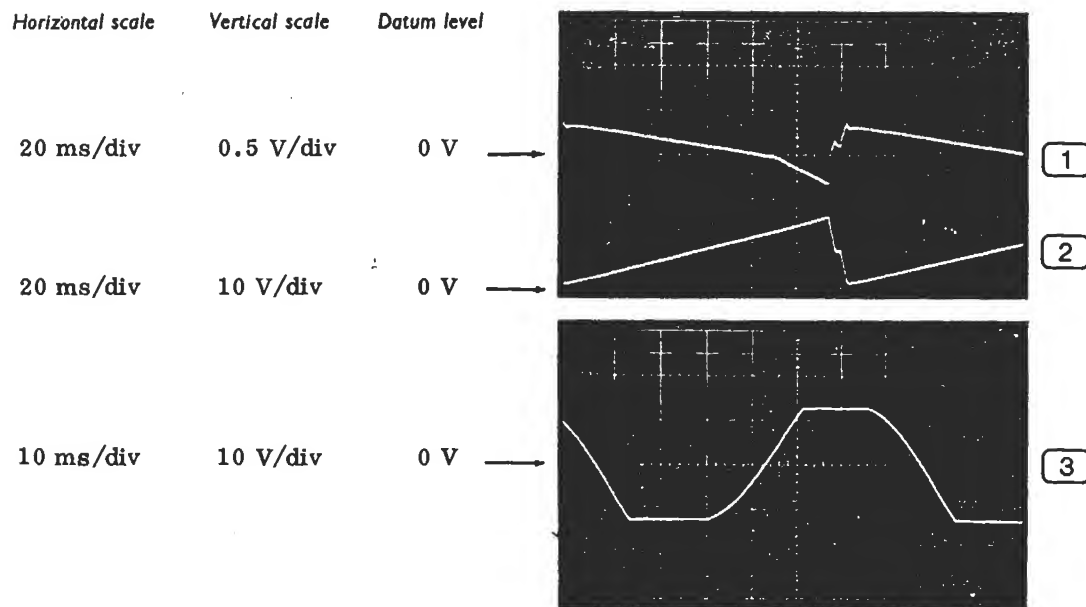
HORIZONTAL SCALE and RANGE : 10 MHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : LH

REFERENCE FREQUENCY 0-110 MHz : One half turn clockwise

For (3), connect pin 9 to earth.



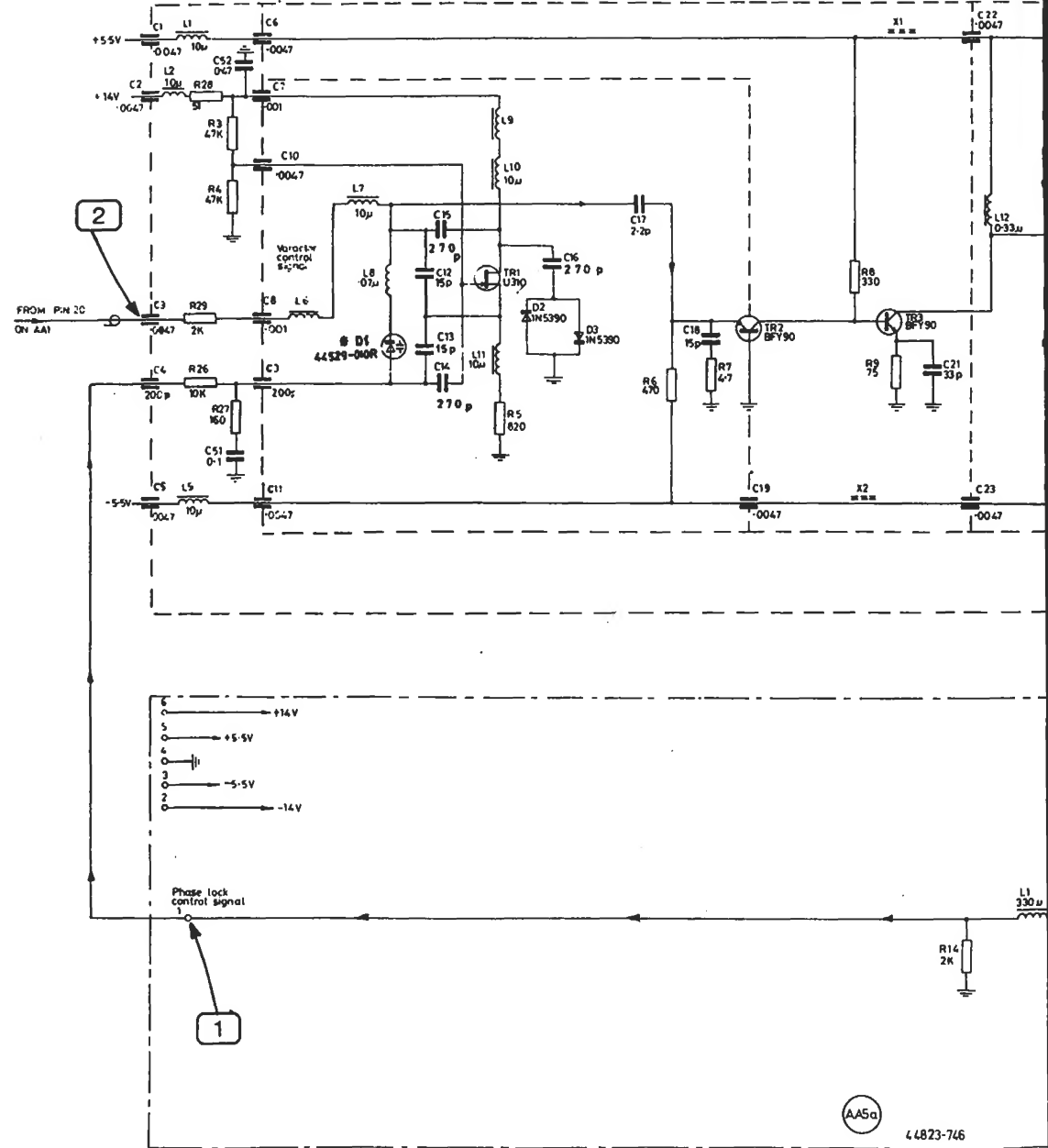
wise

* D1 is one of a matched pair. The other is fitted in a similar position on AA5.

200-310 MHz VARACTOR
CONTROLLED OSCILLATOR

357-500

BUFFER



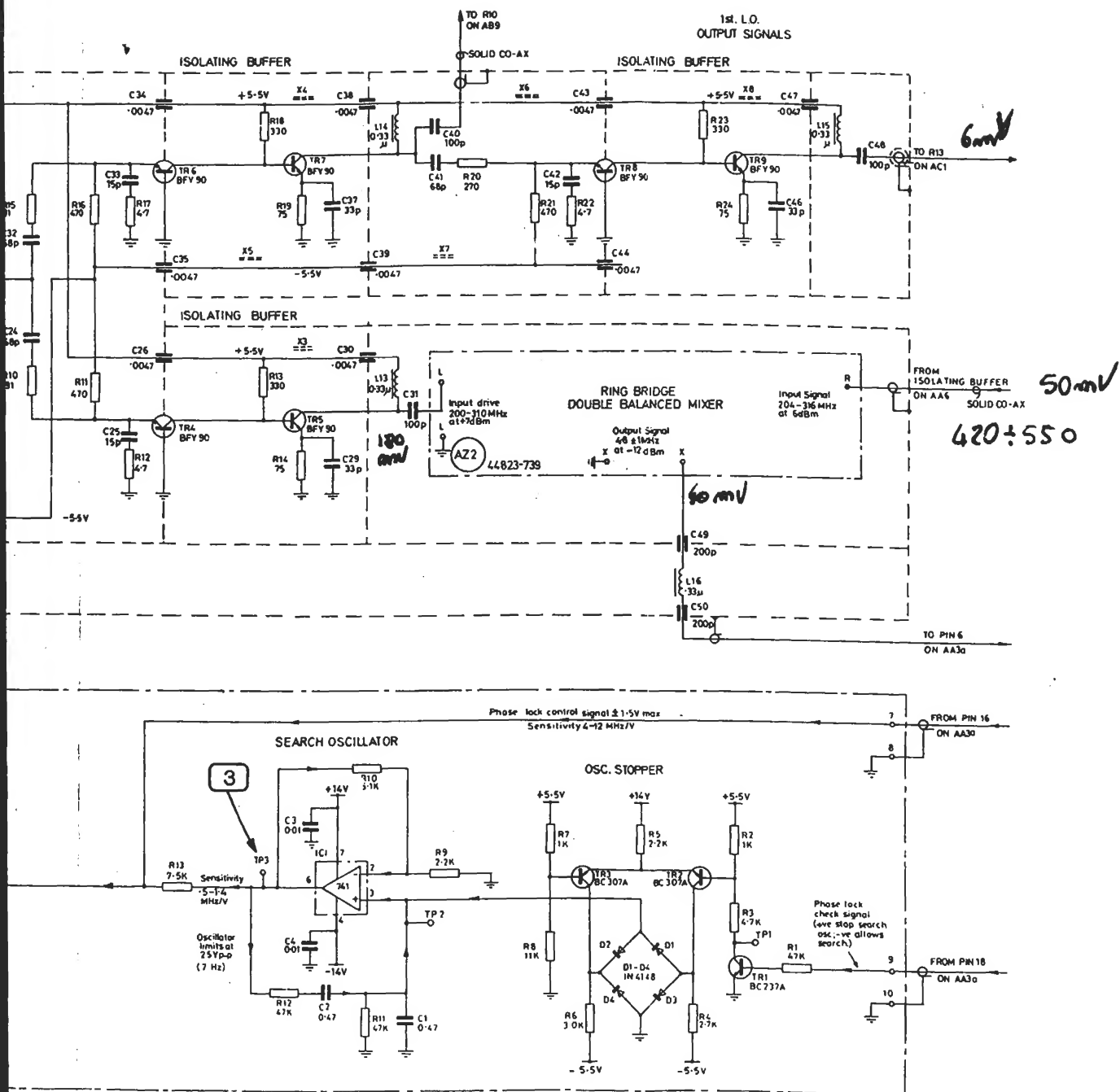


Fig. 7.13 200 to 310 MHz slave first local oscillator AA5

Waveforms for AA6

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : (1) to (5) AUTO

(6) to (8) MANUAL

HORIZONTAL SCALE and RANGE : (1) to (5) 10 MHz/DIV

(6) to (8) 10 kHz/DIV

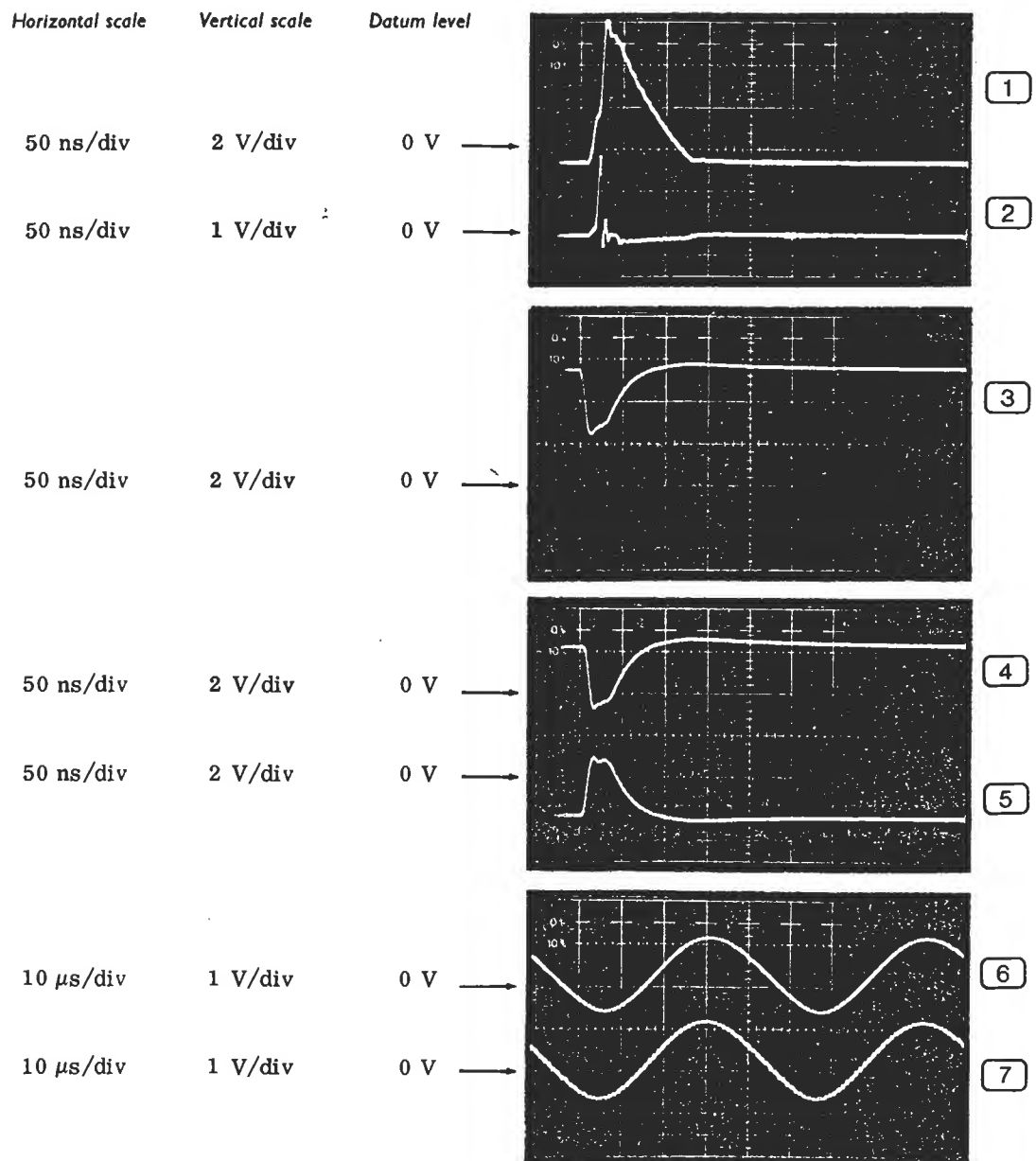
FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY 0-110 MHz : For (6) and (7),

adjusted to give a maximum amplitude sine wave

For (6) and (7), connect pin 1 on AA6a to earth.

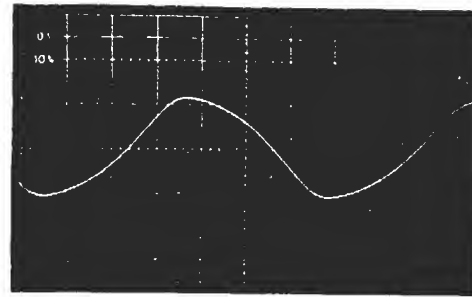
For (8), connect TP2 on AA6a to earth.



10,ms/div

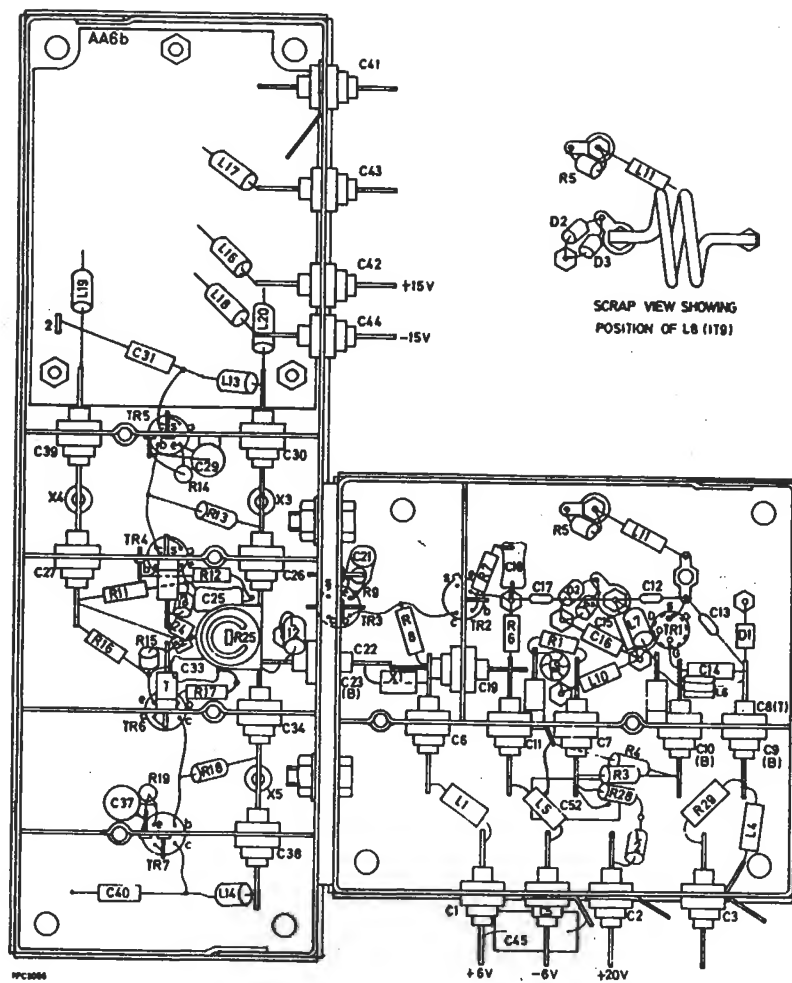
1 V/cm

0 V →



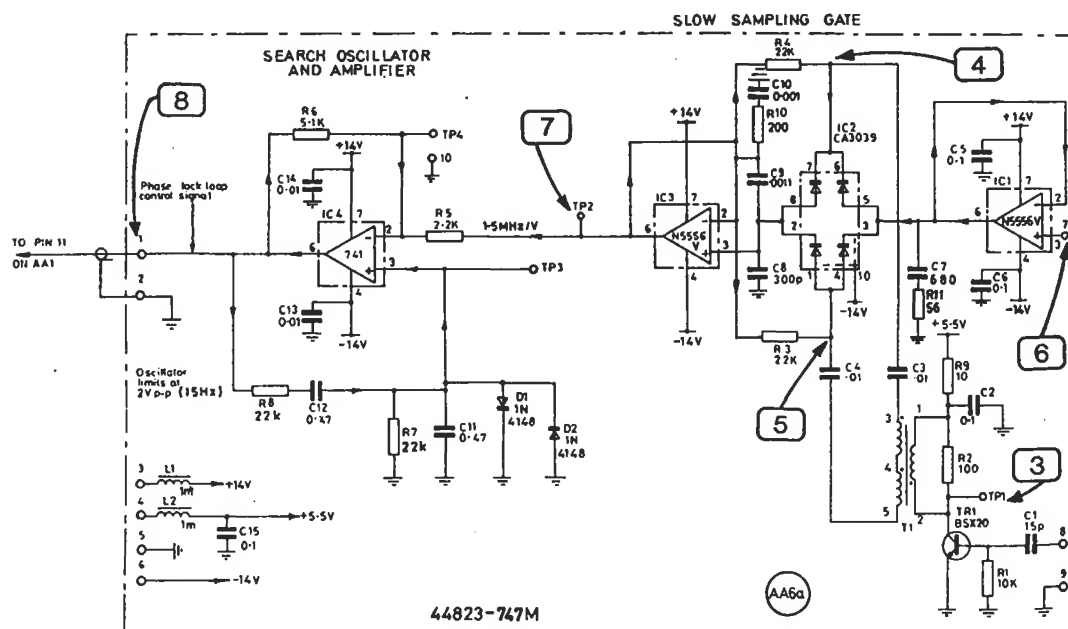
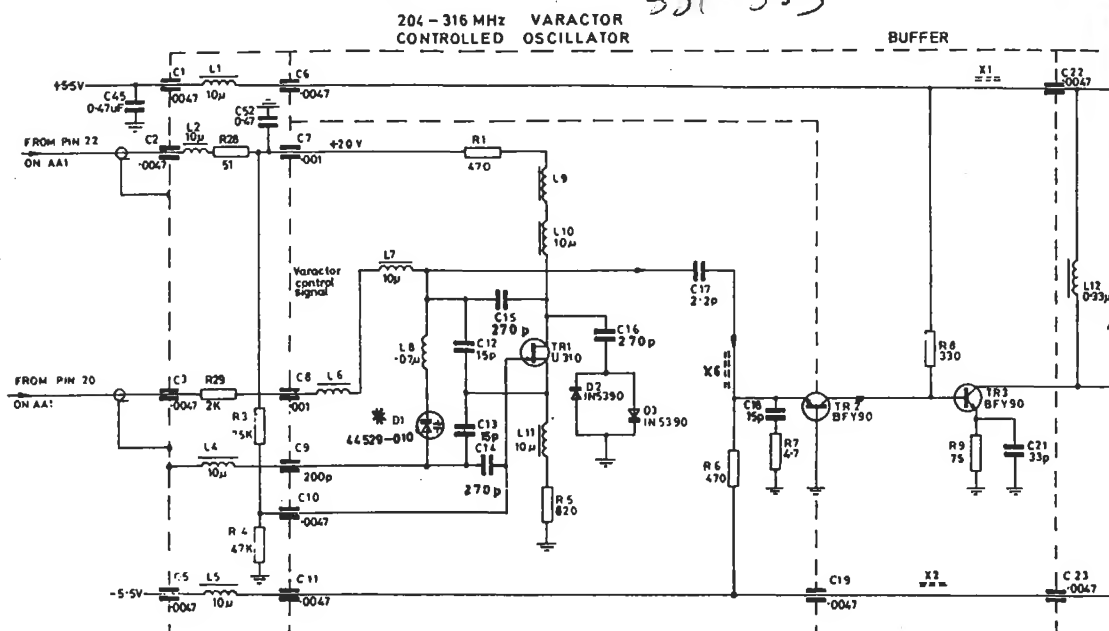
8

Layout for AA6



* D1 is one of a matched pair. The other is fitted in a similar position on AA5.

381-553



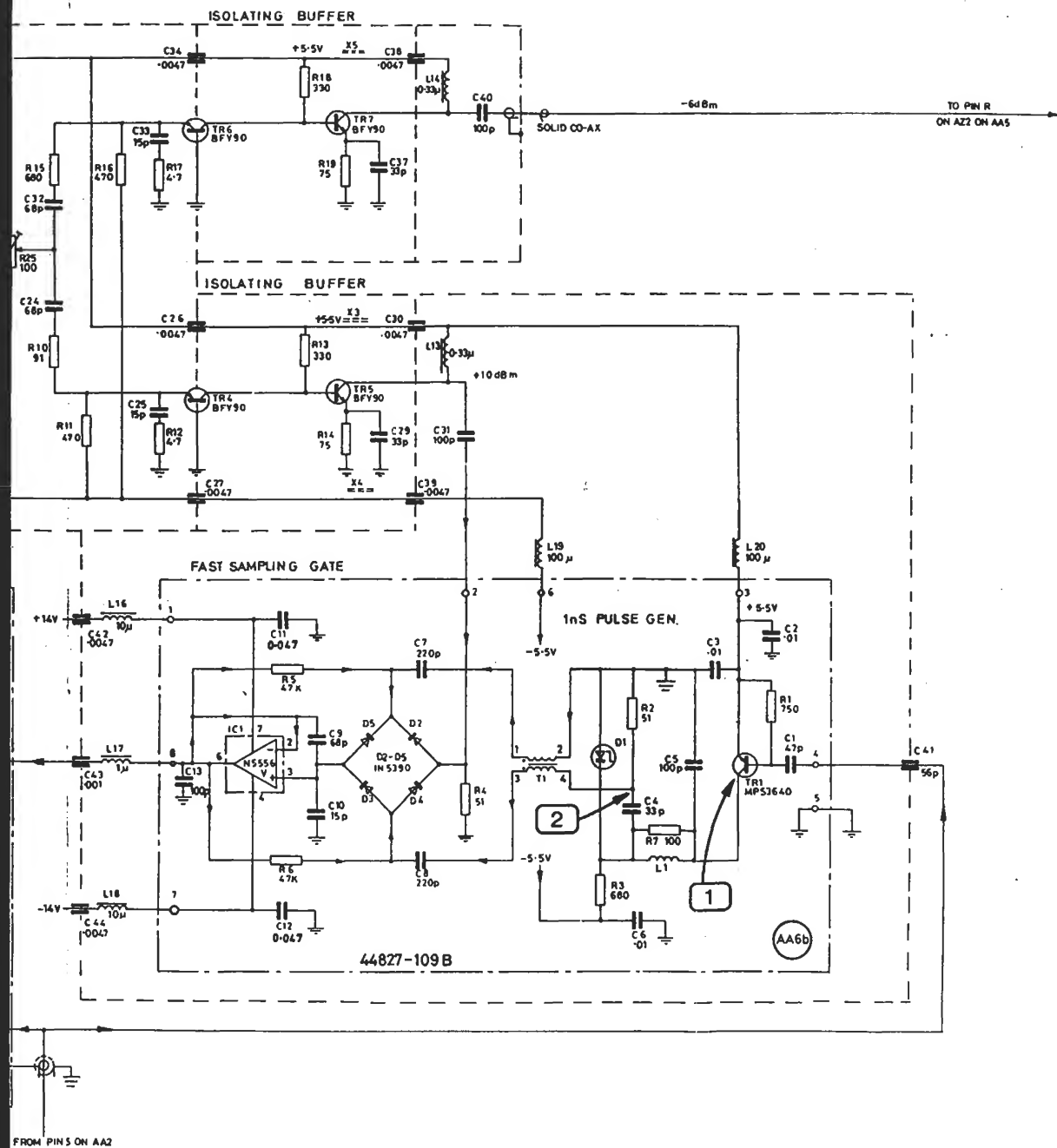


Fig. 7.14 205 to 315 MHz master first local oscillator AA6

Waveforms for AA7

Note Probe connections and earth leads should be as short as possible.

TF 2370 controls - SWEEP MODE : AUTO

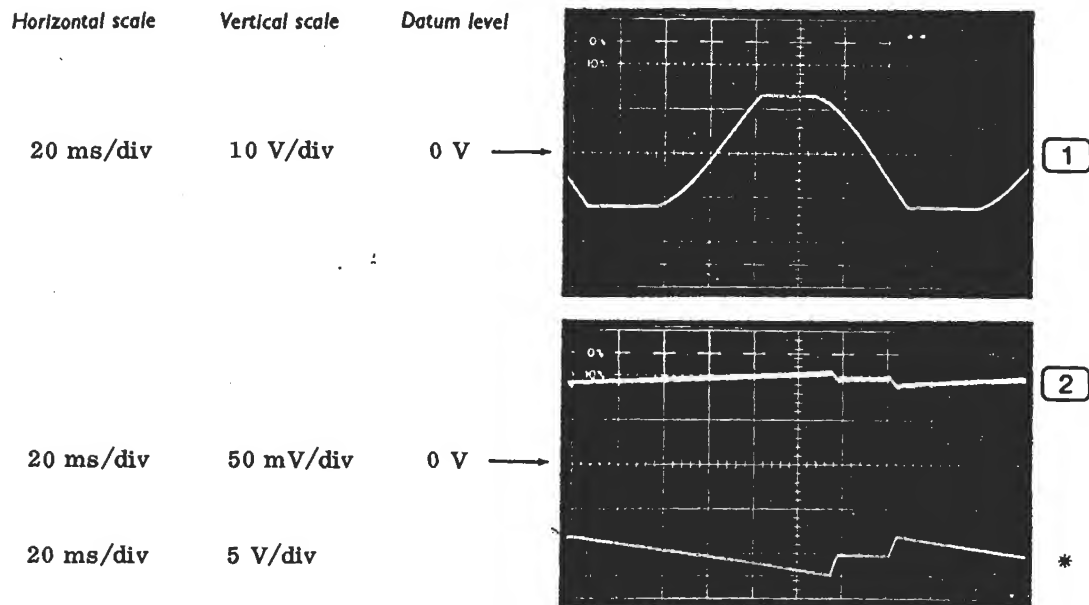
HORIZONTAL SCALE and RANGE : 10 kHz/DIV

FILTER BANDWIDTH : WIDE

REFERENCE FREQUENCY : LH

REFERENCE FREQUENCY ± 70 kHz : Fully counter-clockwise

For (1), connect pin 9 to earth.

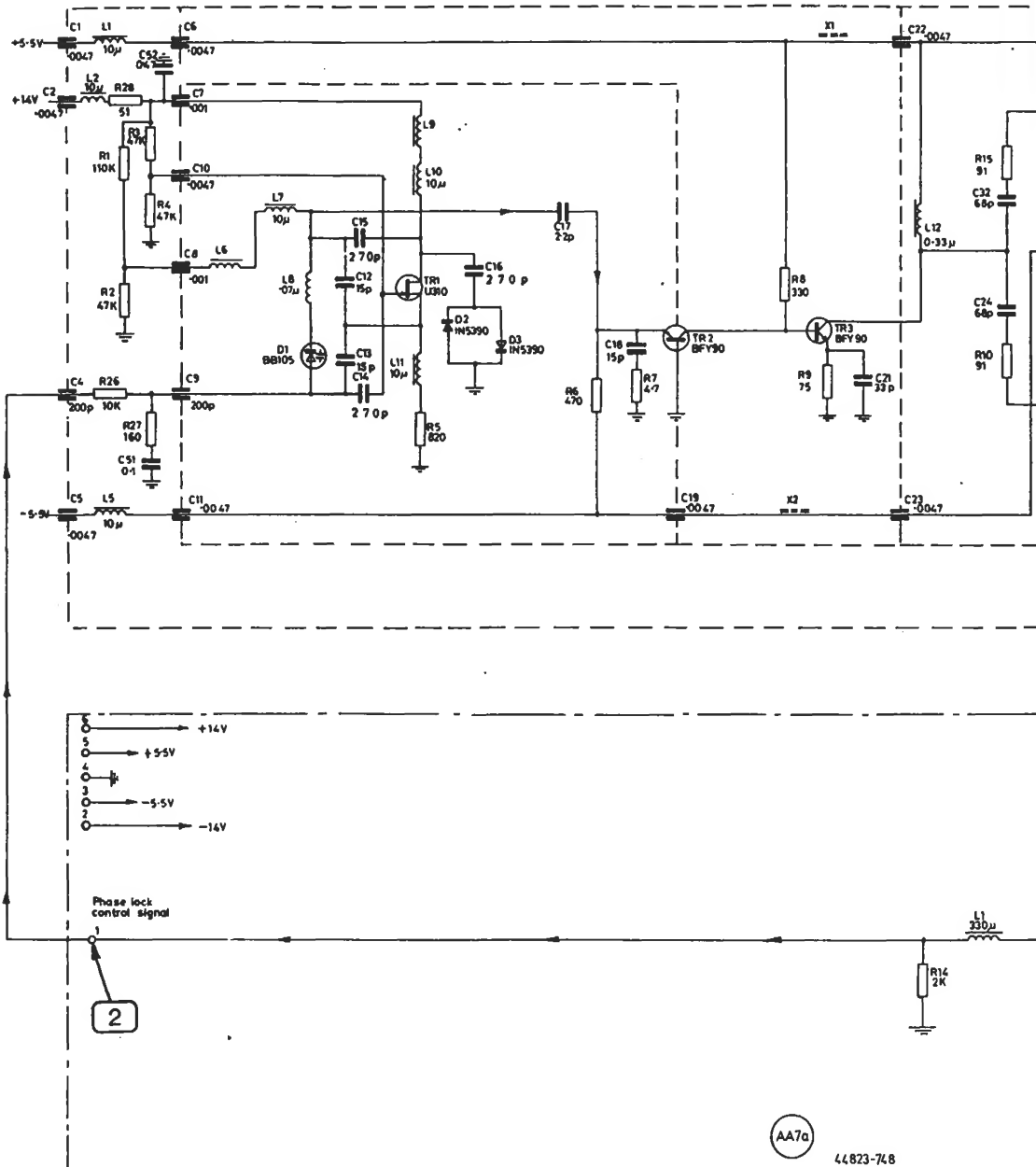


* TP7 on AA1, for timing comparison

357-

236.6 ± 0.15MHz VARACTOR
CONTROLLED OSCILLATOR

BUFFER



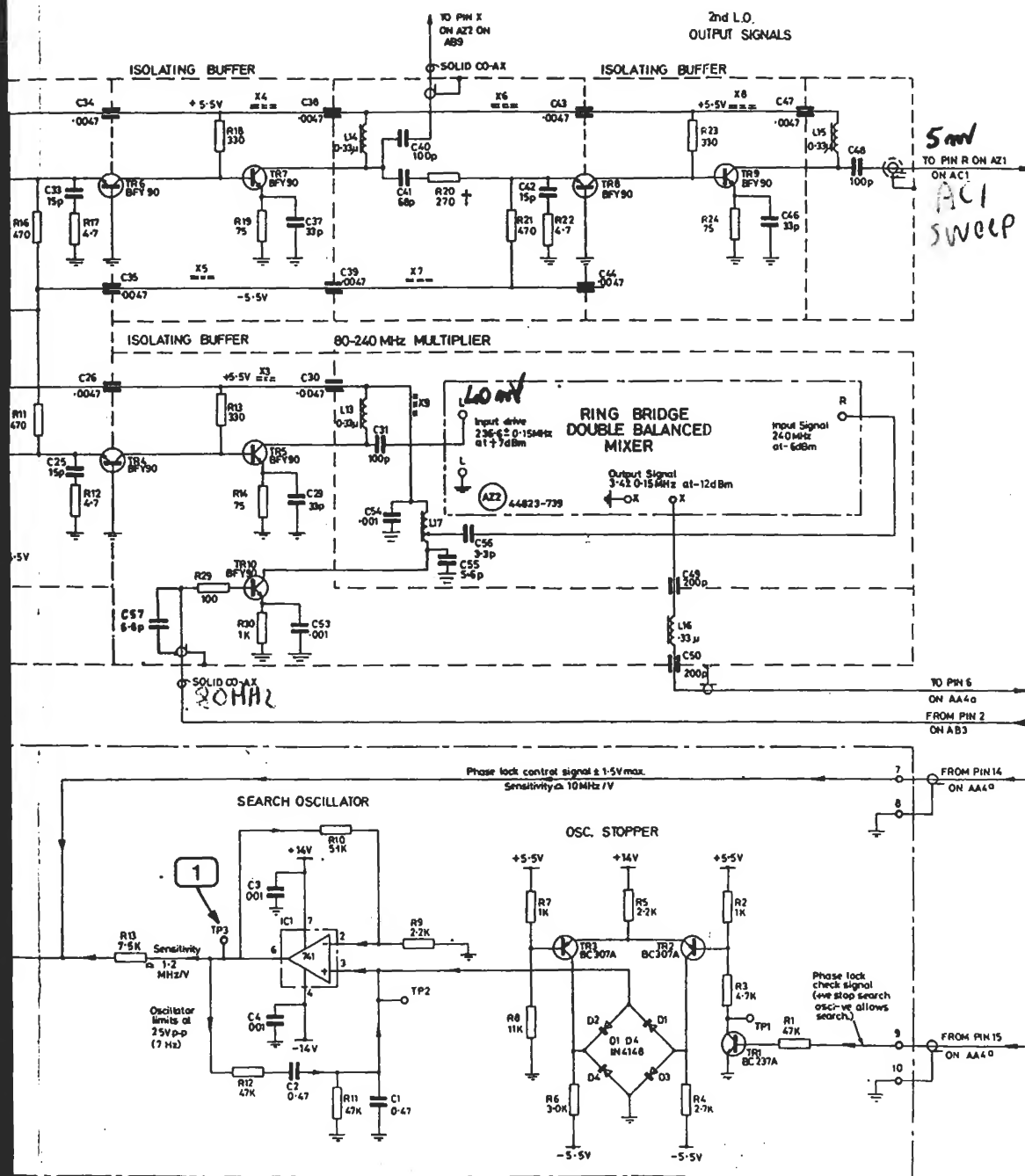


Fig. 7.15 236 MHz slave second local oscillator AA7

Waveforms for AC5

TF 2370 controls - SWEEP MODE : (8) to (14) AUTO for preliminary adjustments and then MANUAL to display the waveforms

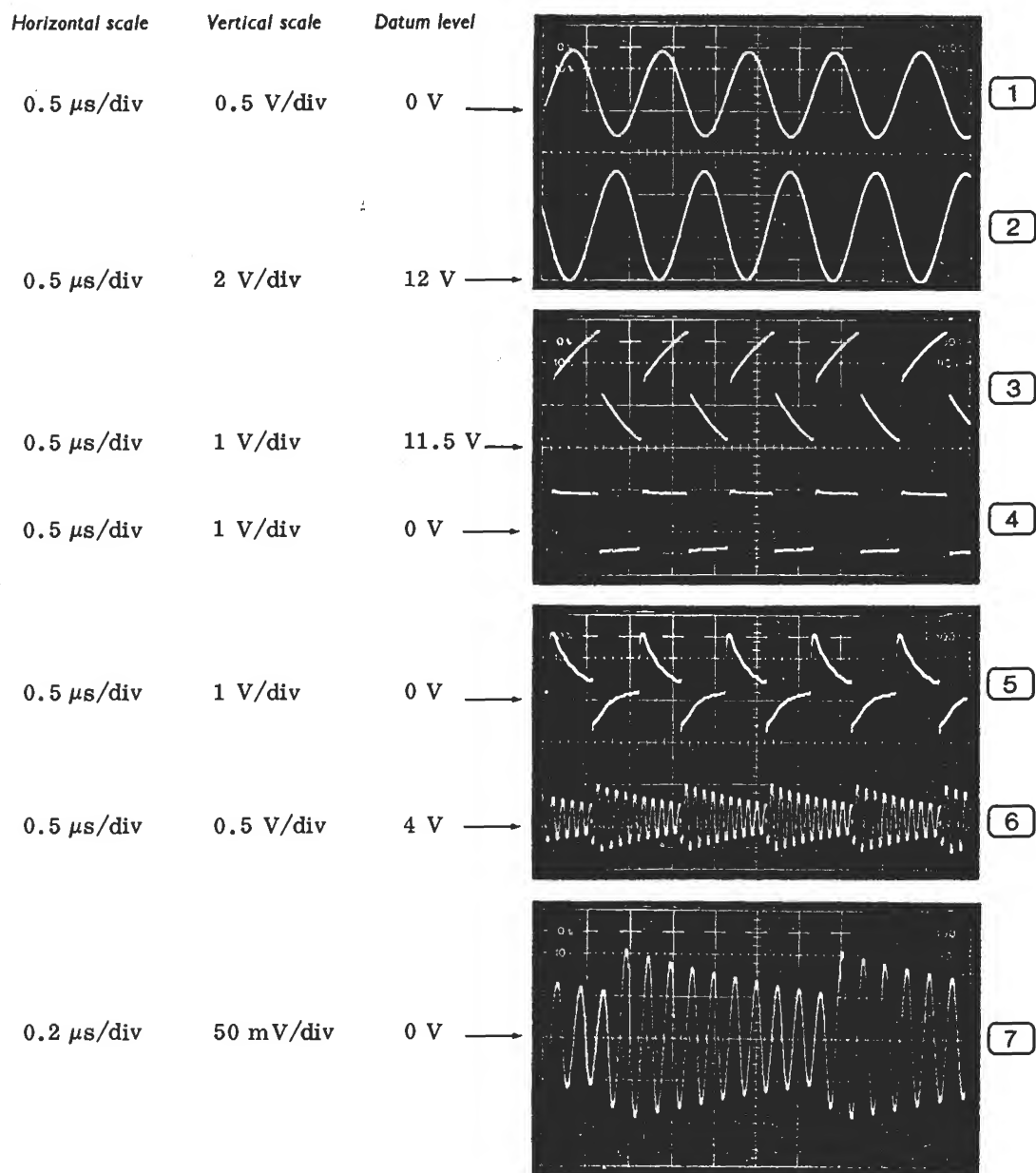
HORIZONTAL SCALE and RANGE : (8) to (14) 10 kHz/DIV

FILTER BANDWIDTH : (8) to (14) WIDE

VERTICAL SCALE and RANGE : (8) to (14) 0 dBm 1 dB/DIV

For (1) to (7), feed a 1 MHz (accuracy better than 1 in 10^7) 1 V p-p signal to the EXTERNAL STANDARD INPUT.

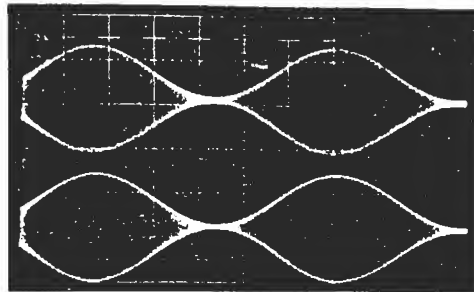
For (8) to (14), feed a 10 MHz signal to the INPUT. Adjust the signal level to give a display on the CATHODE RAY TUBE of the full height of the graticule. Then set the SWEEP MODE to MANUAL and adjust the BRIGHT LINE POSITION to the centre of the signal on display. Also amplitude modulate the 10 MHz signal at 1 kHz to 100% and load the DETECTED OUTPUT with 600 Ω .



0.2 ms/div

50 mV/div

14 V →

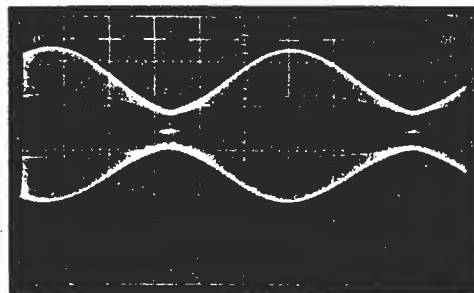


8

0.2 ms/div

1 V/div

9.5 V →

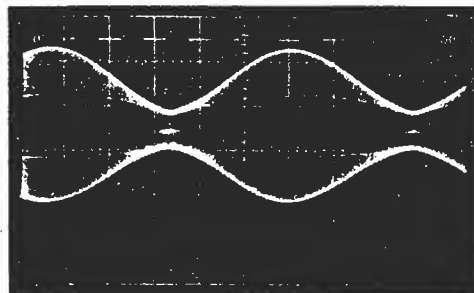


9

0.2 ms/div

2 V/div

0 V →

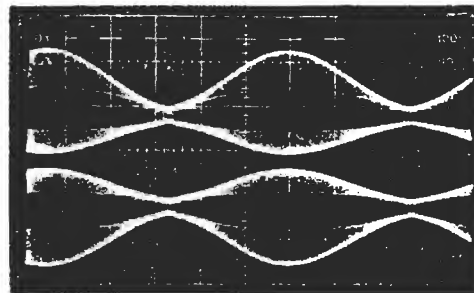


10

0.2 ms/div

2 V/div

0 V →

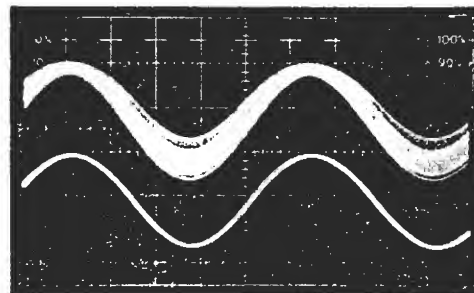


11

0.2 ms/div

2 V/div

0 V →

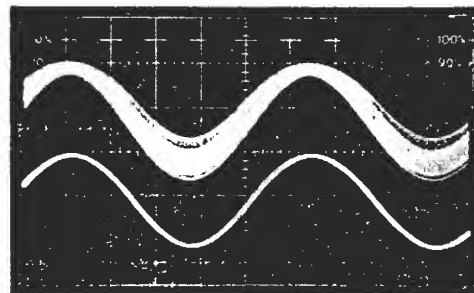


12

0.2 ms/div

2 V/div

0 V →

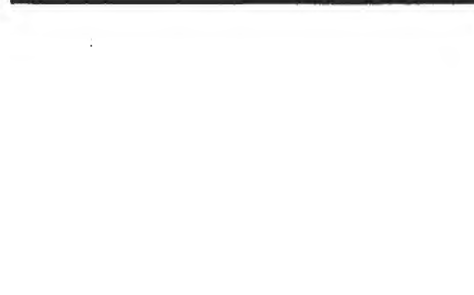


13

0.2 ms/div

1 V/div

0 V →



14

E

9

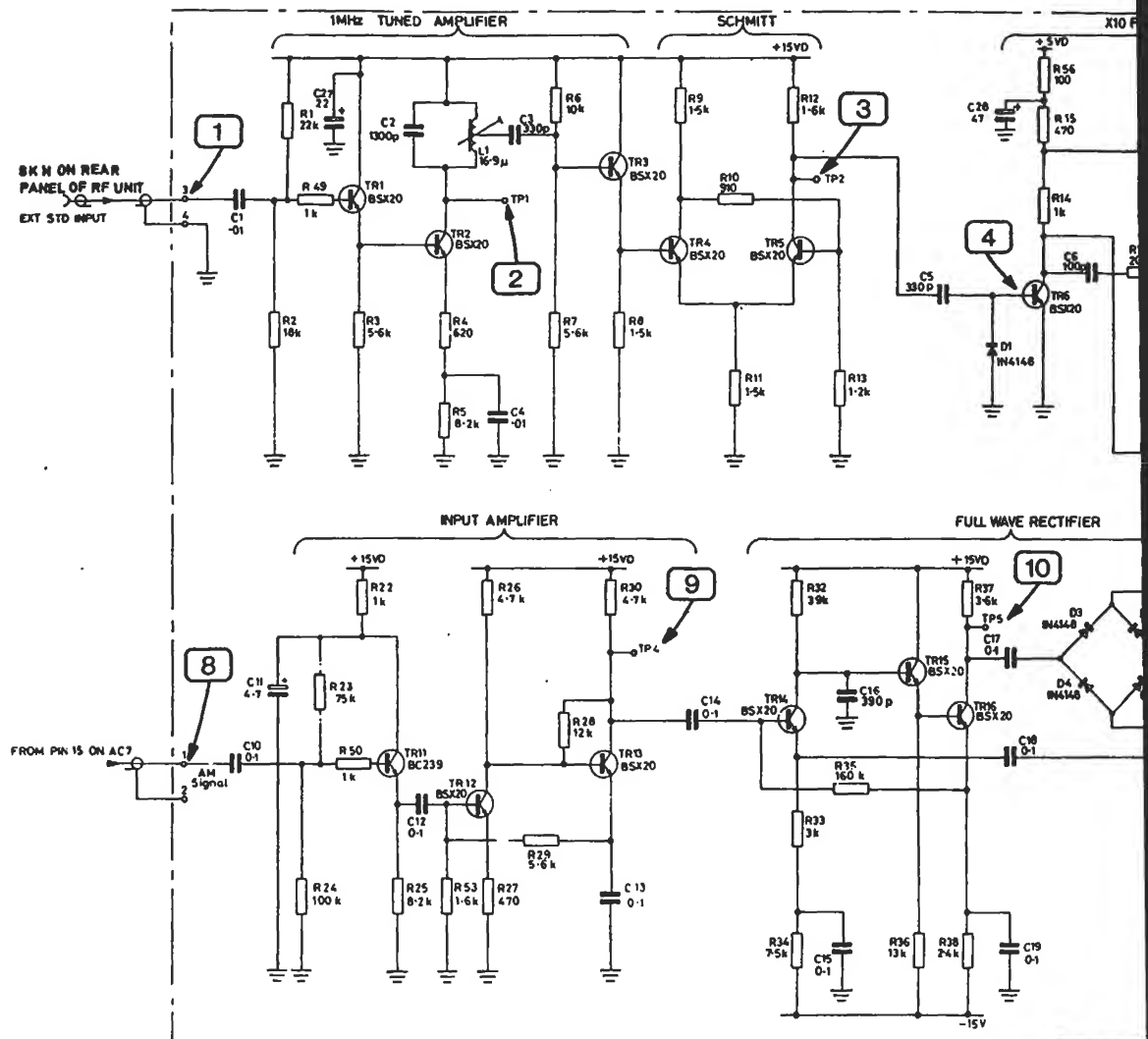
10

11

12

13

14



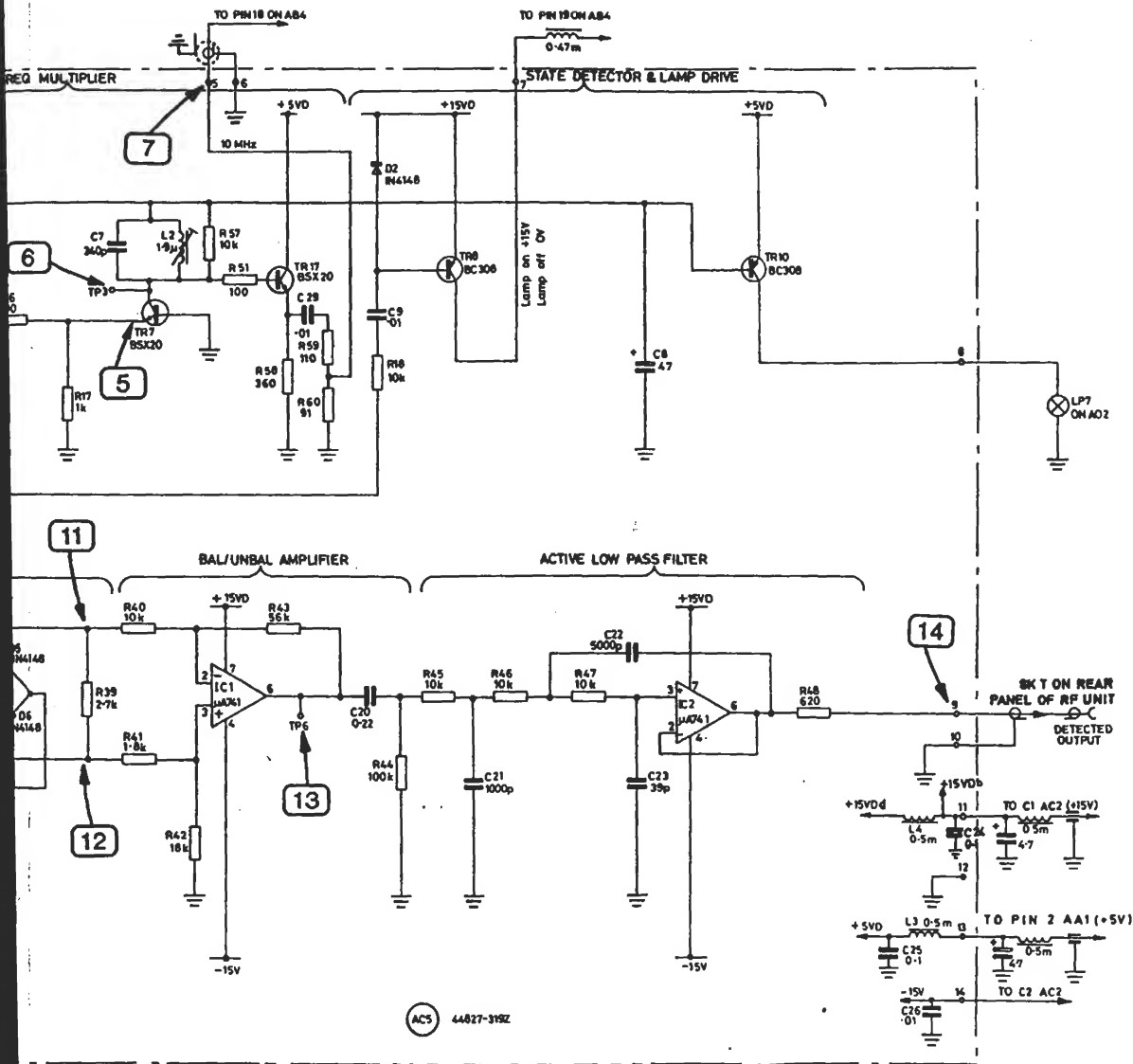


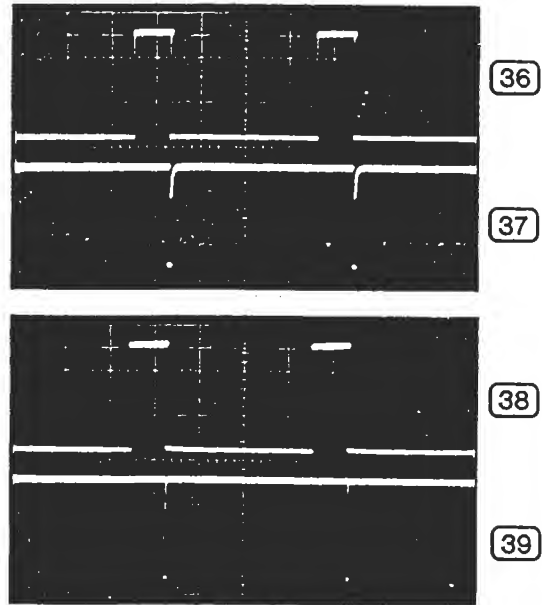
Fig. 7.16 Detector and external reference signal amplifier ACS

50 μ s/div 2 V/div

50 μ s/div 2 V/div

0.5 ms/div 2 V/div

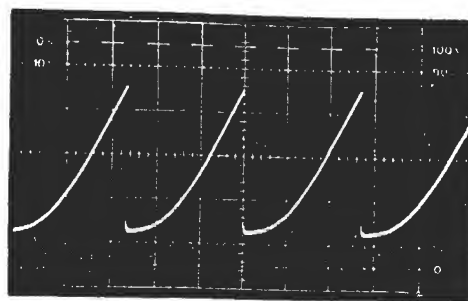
0.5 ms/div 2 V/div



5 ms/div

2 V/div

0 V →

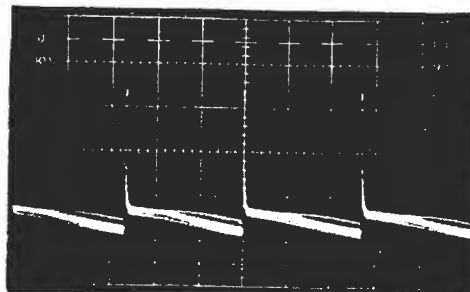


17

5 ms/div

50 V/div

0 V →

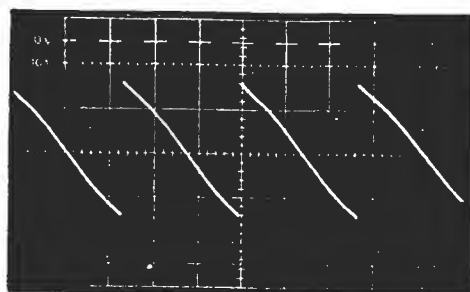


18

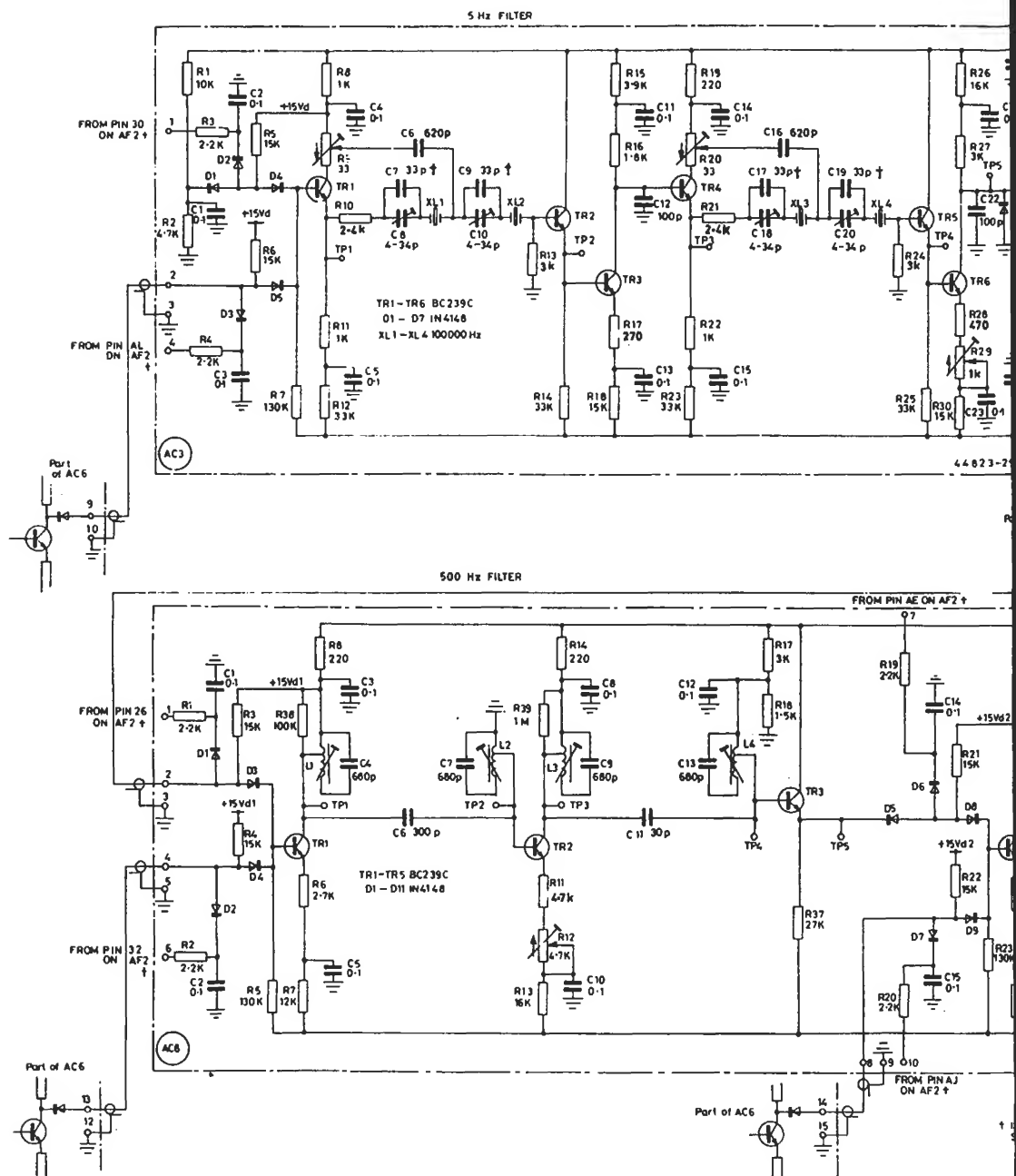
5 ms/div

1 V/div

0 V →



19



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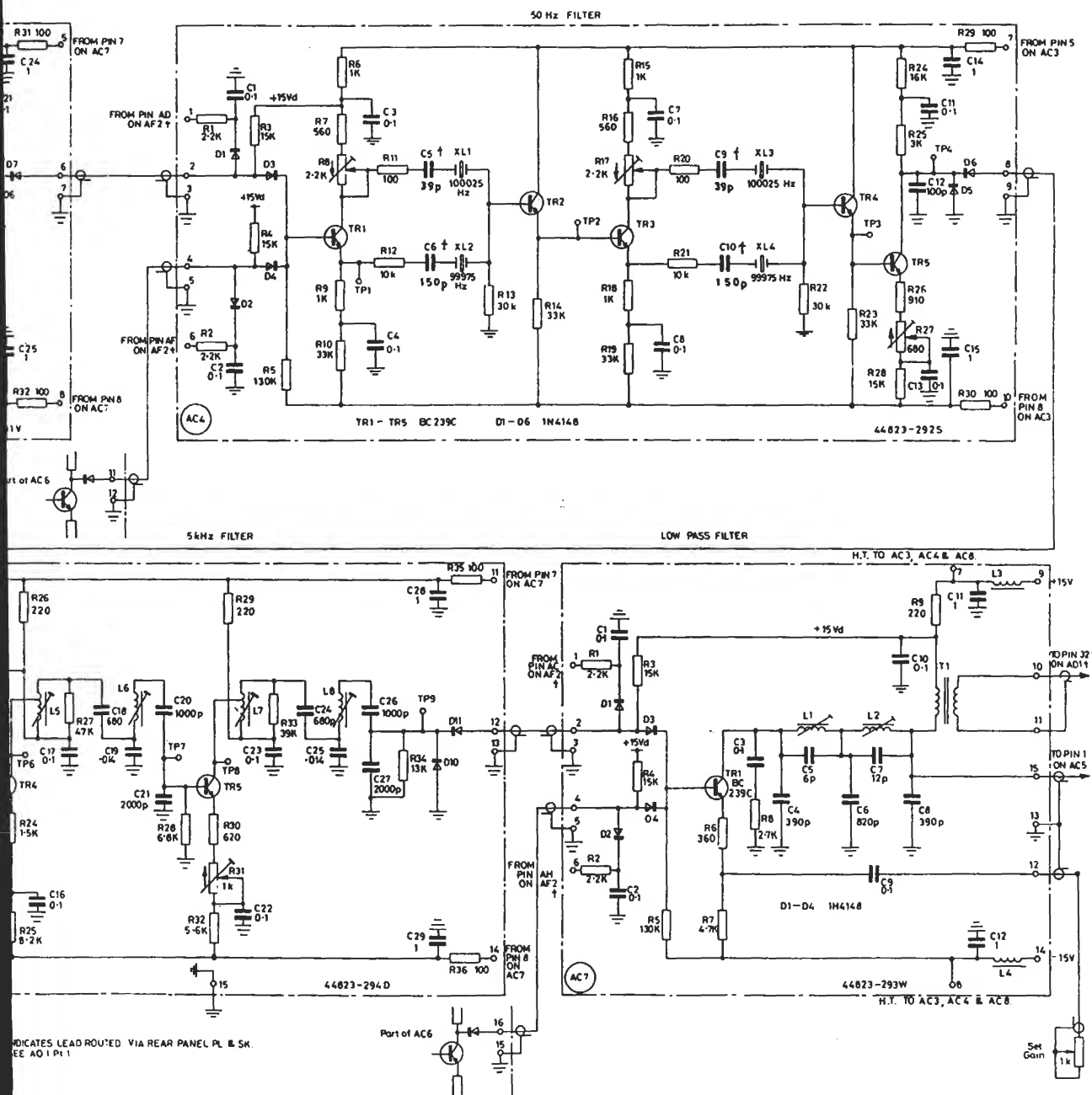


Fig. 7.17 Circuits: AC3, AC4, AC7 and AC8